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

January 11, 2022

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

SUBJECT: CATAWBA NUCLEAR STATION, UNIT 2 – PROPOSED ALTERNATIVE TO USE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE CASE N-885 (EPID L-2021-LLR-0043)

Dear Mr. Simril:

By letter dated June 8, 2021, Duke Energy Carolinas, LLC (Duke Energy, the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for a proposed alternative to the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPV Code), Section XI, at Catawba Nuclear Station, Unit 2. The proposed alternative would allow Duke Energy to use the ASME BPV Code Case N-885, "Alternative Requirements for Table IWB-2500-1, Examination Category B-N-1, Interior of Reactor Vessel, Category B-N-2, Welded Core Support Structures and Interior Attachments to Reactor Vessels, Category B-N-3, Removable Core Support Structures: Section XI, Division 1," at Catawba Nuclear Station, Unit 2, for the current fourth inservice inspection interval.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), the licensee requested to use the ASME BPV Code Case N-885 on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed the proposed alternative and concludes, as set forth in the enclosed safety evaluation, that Duke Energy has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1).

All other ASME BPV Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including the third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Project Manager, Zackary Stone, at (301) 415-0615 or by e-mail at Zackary.Stone@nrc.gov.

Sincerely,

Michael T. Markley

Digitally signed by Michael T. Markley
Date: 2022.01.11 14:28:30 -05'00'

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No: 50-414

Enclosure:
Safety Evaluation

cc: Listserv

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE REQUEST RA-21-0100

TO USE ASME CODE CASE N-885

RENEWED FACILITY OPERATING LICENSE NO. NPF-52

DUKE ENERGY CAROLINAS, LLC

CATAWBA NUCLEAR STATION, UNIT 2

DOCKET NO. 50-414

1.0 INTRODUCTION

By letter dated June 8, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21159A124), Duke Energy Carolinas, LLC (Duke Energy, the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for a proposed alternative to the requirements of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPV Code), Section XI, at Catawba Nuclear Station, Unit 2. The proposed alternative would allow Duke Energy to use the ASME BPV Code Case N-885, "Alternative Requirements for Table IWB-2500-1, Examination Category B-N-1, Interior of Reactor Vessel, Category B-N-2, Welded Core Support Structures and Interior Attachments to Reactor Vessels, Category B-N-3, Removable Core Support Structures: Section XI, Division 1," at Catawba Nuclear Station, Unit 2, for the current fourth inservice inspection (ISI) interval.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), the licensee requested to use the ASME BPV Code Case N-885 on the basis that the alternative provides an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

Regulations in 10 CFR 50.55a(g)(4) state, in part, that ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in Section XI of the applicable editions and addenda of the ASME BPV Code to the extent practical within the limitation of design, geometry, and materials of construction of the components.

Regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements in paragraphs (b) through (h) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (1) the proposed alternative would provide an acceptable level of quality and safety, or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Proposed Alternative RA-21-0100

3.1.1 ASME Code Components Affected

The components affected by this request are the accessible areas, welds, and surfaces associated with the reactor vessel interior that are included in Examination Categories B-N-1, B-N-2, and B-N-3, Item Nos. B13.10, B13.50, B13.60, and B13.70, of the ASME BPV Code, Section XI.

3.1.2 Applicable Code Edition and Addenda

The licensee identified the currently applicable edition and addenda of the ASME BPV Code, Section XI, as shown in the table below. In addition, the table shows the current 10-year ISI interval, including the start and end dates, for Catawba Nuclear Station, Unit 2.

Table 1: Current ASME BPV Code, Section XI, Code of Record

PLANT	ISI INTERVAL	SECTION XI EDITION	START	END
Catawba Nuclear Station Unit 2	4th	2007 Edition, through 2008 Addenda	8/19/2015	2/24/2026

3.1.3 ASME BPV Code Requirements

The ASME BPV Code, Section XI, identifies, in part, the following Examination Categories: B-N-1, interior of reactor vessel; B-N-2, welded core support structures and interior attachments to reactor vessels; and B-N-3, removable core support structures. ASME Code, Section XI, IWB-2500(a), Table IWB-2500-1 (B-N-1, B-N-2, B-N-3) and IWB-3520, of the 2007 Edition with the 2008 Addenda provide requirements and acceptance standards for performing VT-1 or VT-3 examination of the reactor vessel interior surfaces, reactor vessel interior attachments, and core support structures.

3.1.4 Proposed Alternative

Catawba Nuclear Station, Unit 2, is a pressurized-water reactor (PWR). For PWRs, the components subject to the examination requirements in Table IWB-2500-1 (B-N-1, B-N-2, B-N-3) are identified as Item Nos. B13.10, B13.50, B13.60, and B13.70. The current PWR requirements for these examinations are summarized in Table 2 below. For Catawba Nuclear Station, Unit 2, Duke Energy proposes to implement the requirements of ASME Code Case N-885 in lieu of the requirements of ASME Code, Section XI, IWB-2500(a), Table IWB-2500-1 (B-N-1, B-N-2, B-N-3), and IWB-3520.

Code Case N-885 eliminates Examination Category B-N-1 and Item No. B13.10. Examination Categories B-N-2 and B-N-3 are combined into a single Examination Category B-N. The examination requirements for Examination Categories B-N-2 and B-N-3 (Item Nos. B13.50, B13.60, and B13.70) are retained, but the parts descriptions and numbering are revised. The acceptance standard for VT-1 visual examination is retained, but renumbered. The acceptance standard for VT-3 visual examination is revised and renumbered. The PWR requirements for the new Examination Category B-N in Code Case N-885 are summarized in Table 3 below.

Table 2: Summary of Current PWR Requirements for Examination Categories B-N-1, B-N-2, and B-N-3

Item No.	Parts Examined	Examination Requirements and Method	Acceptance Standard
B13.10	Vessel Interior (B-N-1)	VT-3 visual examination of accessible areas	IWB-3520.2
B13.50	Interior attachments with beltline region (B-N-2)	VT-1 visual examination of accessible welds	IWB-3520.1
B13.60	Interior attachments beyond beltline region (B-N-2)	VT-3 visual examination of accessible welds	IWB-3520.2
B13.70	Core support structure (structure removed from reactor vessel for examination) (B-N-3)	VT-3 visual examination of accessible surfaces	IWB-3520.2

Table 3: Summary of Code Case N-885 PWR Requirements for New Examination Category B-N

Item No.	Parts Examined	Examination Requirements and Method	Acceptance Standard
B13.10	Interior welded attachments within beltline region	VT-1 visual examination of accessible welds	-3520.1
B13.20	Interior welded attachments beyond beltline region	VT-3 visual examination of accessible welds	-3520.2
B13.30	Welded core support structure (structure removed from reactor vessel for examination)	VT-3 visual examination of accessible surfaces	-3520.2
B13.40	Removable core support structure (structure removed from reactor vessel for examination)	VT-3 visual examination of accessible surfaces	-3520.2

3.1.5 Duration of the Proposed Alternative

The proposed alternative is requested for the duration of the current ISI interval (i.e., fourth ISI interval) that runs from August 19, 2015, to February 24, 2026.

3.2 NRC Staff's Evaluation

For Catawba Nuclear Station, Unit 2, the licensee proposed to use Code Case N-885 as an alternative to the applicable inspection requirements in Table IWB-2500-1 (B-N-1, B-N-2, B-N-3) and IWB-3520 of the ASME BPV Code, Section XI. The proposed alternative would eliminate the VT-3 visual examination of the accessible surfaces of the reactor vessel interiors (Examination Category B-N-1) at this facility. The proposed alternative also changes the requirements for the current Examination Categories B-N-2 and B-N-3, which would be combined into a single Examination Category B-N in the Code Case.

3.2.1 Elimination of Examination Category B-N-1

The proposed alternative would allow the licensee to eliminate the examinations currently required by the ASME BPV Code, Section XI, for Examination Category B-N-1. Specifically, the

licensee would no longer be required to perform the VT-3 visual examinations and associated acceptance standards of the reactor vessel interior (current Item No. B13.10) each inspection period.

The licensee stated, in part, that based on industry efforts it was concluded that the purpose of B-N-1 examinations is to detect foreign material and debris and that other industry requirements and guidance are sufficient for detecting foreign material or debris in the reactor vessel. Foreign material and debris examinations such as core plate Foreign Object Search and Retrieval (FOSAR) prior to fuel load and core verification after fuel load are performed during each refueling outage. If foreign material or debris is observed, maintenance practices are established to either remove the foreign material, or evaluate the consequences if not removing, prior to the reactor vessel head closure. The licensee stated that these activities occur each refueling outage and are more frequent than the current code requirement of each inspection period and provide appropriate processes to adequately address detrimental foreign material within the reactor vessel.

The licensee further stated that there are numerous other activities that occur during refueling outages that provide opportunities for detecting adverse conditions in the interior of the reactor vessel such as:

- FOSAR, which is performed during refueling outages.
- Core verification activities.
- PWR internals examinations performed during the period of extended operation per MRP-227, “Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines.”
- Other Section XI examinations including Examination Categories B-A, B-D, B-N-2, and B-N-3. The current Code B-N-2 and B-N-3 examinations will continue under Code Case N-885 as Examination Category B-N, Item Numbers B13.10, B13.20, B13.30, and B13.40.
- Reactor vessel internals component maintenance and inspection activities such as normal component movement to support refueling, and industry and Nuclear Steam Supply System (NSSS) or fuel supplier bulletin inspections.

The NRC staff notes that the status and condition of the reactor vessel interior is frequently monitored by the plant personnel through core verification, FOSAR, and other examination activities as described above. The FOSAR and core verification activities entail monitoring of the reactor vessel interior surfaces of the surrounding areas. The NRC staff determined that these activities are similar to the VT-3 visual examination of the reactor vessel interior, and, therefore, would provide similar results regarding the status of the reactor vessel interior surface.

The NRC staff notes that the periodic inspection of the reactor vessel interior attachments and removable core support structures would continue to be required under Code Case N-885, which provide reasonable assurance that the reactor vessel interior surfaces located near these components would also be monitored periodically.

Based on the above, the NRC staff concludes that the elimination of the requirements for Examination Category B-N-1 would not compromise the quality and safety of the reactor vessel interior surfaces, because adverse conditions, such as the presence of foreign material or debris on the vessel interior surface, would be identified in a timely manner through core verification,

FOSAR, and other examination activities. Therefore, the NRC staff finds the use of Code Case N-885, which eliminates the examinations currently required by the ASME BPV Code, Section XI, for Examination Category B-N-1, is acceptable.

3.2.2 Requirements for the New Examination Category B-N

The proposed alternative would combine the current Examination Categories B-N-2 and B-N-3 into a single new Examination Category B-N. The examination requirements for Examination Categories B-N-2 and B-N-3, Item Nos. B13.50, B13.60, and B13.70, are retained, but the parts descriptions and numbering are revised. The acceptance standard for VT-1 visual examinations are retained, but renumbered, whereas the acceptance standard for VT-3 visual examination is revised and renumbered. The NRC staff notes that the purpose of these examinations is to identify conditions that may impact the structural integrity or functionality of these components. The current acceptance standard for VT-3 visual examinations of components under Examination Categories B-N-2 and B-N-3 are specified in subparagraph IWB-3520.2 of the ASME BPV Code, Section XI. The NRC staff also notes that the revised acceptance standard (-3520.2) in Code Case N-885 for the VT-3 examination of components under the new Examination Category B-N is consistent with subparagraph IWB-3520.2, except that the Code Case does not explicitly require corrective action if foreign materials or accumulation of corrosion products that could interfere with control rod motion or could result in blockage of coolant flow through fuel are identified.

In its alternative request dated June 8, 2021, the licensee stated that the Duke Energy Corrective Action Program would be utilized if conditions that could interfere with control rod motion or result in blockage of coolant flow through reactor fuel were identified. The licensee is required per 10 CFR 50 Appendix B, Criterion XVI, to have a corrective action program to ensure conditions adverse to quality are corrected. The NRC staff notes that this proposed alternative does not alter these requirements associated with Appendix B to 10 CFR Part 50. Additionally, the license stated that the Duke Energy Corrective Action Program also ensures compliance with technical specification requirements (e.g., operability definition, limiting conditions for operations, surveillance requirements) related to control rods, reactor fuel, and the emergency core cooling system.

Based on the above, the NRC staff concludes that the use of Code Case N-885, as an alternative to the current requirements for Examination Categories B-N-2 and B-N-3, will provide an acceptable level of quality and safety for the examinations performed for the reactor vessel. The licensee will continue to perform examinations of the reactor vessel consistent with the current examination requirements for Examination Categories B-N-2 and B-N-3 under the proposed alternative. The NRC staff also determined that the licensee will (1) continue to have effective means of detecting foreign materials and accumulation of corrosion products within the reactor vessel, and (2) continue to take appropriate corrective actions, in accordance with Criterion XVI of 10 CFR Part 50, Appendix B, if foreign materials or accumulation of corrosion products that could interfere with control rod motion or could result in blockage of coolant flow through fuel are discovered. Therefore, the NRC staff finds it acceptable to use Code Case N-885 at Catawba Nuclear Station, Unit 2, as an alternative to the current requirements for Examination Categories B-N-2 and B-N-3.

4.0 CONCLUSION

As set forth above, the NRC staff determined that use of the proposed alternative will provide an acceptable level of quality and safety. Accordingly, the NRC staff concludes that Duke Energy

has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes Duke Energy to use the proposed alternative described in its application at Catawba Nuclear Station, Unit 2. This authorization is for the remainder of the current fourth 10-year ISI interval for this facility.

NRC approval of this alternative does not imply or infer the NRC approval of Code Case N-885 for generic use. All other ASME BPV Code, Section XI, requirements for which an alternative was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: O. Yee, NRR

Date: January 11, 2022

SUBJECT: CATAWBA NUCLEAR STATION, UNIT 2 – PROPOSED ALTERNATIVE TO USE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE CASE N-885 (EPID L-2021-LLR-0043) DATED JANUARY 11, 2022

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