



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

March 26, 2021

Mr. Daniel G. Stoddard  
Senior Vice President and  
Chief Nuclear Officer  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 29060

SUBJECT: MILLSTONE POWER STATION, UNIT NOS. 2 AND 3, NORTH ANNA POWER STATION, UNIT NOS. 1 AND 2, SURRY POWER STATION, UNIT NOS. 1 AND 2, AND VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1 –  
RE: REQUEST TO UTILIZE CODE CASE N-885 (EPID L-2020-LLR-0115)

Dear Mr. Stoddard:

By letter dated August 24, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20237F571), as supplemented by letter dated March 3, 2021 (ADAMS Accession No. ML21062A259) Dominion Nuclear Connecticut, Inc., Virginia Electric and Power Company, and Dominion Energy South Carolina, Inc. (Dominion) requested approval to use American Society of Mechanical Engineers (ASME) 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 the Millstone Power Station, Units 2 and 3 (Millstone), North Anna Power Station, Units 1 and 2 (North Anna), Surry Power Station, Units 1 and 2 (Surry), and Virgil C. Summer Nuclear Station, Unit 1 (Summer).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) paragraph 50.55a(z)(2), the licensee proposed that compliance with the applicable ASME Code would result in hardship without a compensating increase in quality and safety. In lieu of the requirements, the licensee proposes to use the alternative examination requirements described in Code Case N-885. Based on its review, the NRC staff determined that this submittal should be approved under the provisions 10 CFR Part 50a(z)(1).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that Dominion has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z) and demonstrated the proposed alternative would provide an acceptable level of quality and safety. Therefore, in accordance with 10 CFR 50.55a(z)(1), the NRC staff authorizes the use of Code Case N-885 for Millstone, North Anna, Surry, and Summer, until the end of the current 10-year inservice inspection (ISI) Program Test interval for each unit as specified in the attached safety evaluation.

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

If you have any questions, please contact the Project Manager, Ed Miller at 301-415-2481 or via e-mail at [Ed.Miller@nrc.gov](mailto:Ed.Miller@nrc.gov).

Sincerely,

Michael T. Markley, Chief  
Plant Licensing Branch 2-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-336, 50-423, 50-338, 50-339, 50-280, 50-281, and 50-395

Enclosure:  
Safety Evaluation

cc: Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST TO USE ASME CODE CASE N-885

DOMINION ENERGY NUCLEAR CONNECTICUT, INC.

VIRGINIA ELECTRIC POWER COMPANY

DOMINION ENERGY SOUTH CAROLINA, INC.

MILLSTONE POWER STATION UNIT NOS. 2 AND 3

NORTH ANNA POWER STATION, UNIT NOS. 1 AND 2

SURRY POWER STATION, UNIT NOS. 1 AND 2

VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 2

DOCKET NOS. 50-336, 50-423, 50-338, 50-339, 50-280, 50-281, AND 50-395

1.0 INTRODUCTION

By letters dated August, 24, 2020, and March 3, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML20237F571 and ML21062A259, respectively), Dominion Energy Connecticut Inc., Virginia Electric Power Company, and Dominion Energy South Carolina Inc., (hereafter referred to as the licensee), submitted an alternative relief request for an authorization under the provisions of Title 10 of the Code of Federal Regulations (10 CFR) Section 50.55a "Codes and standards," subparagraph (z)(2), "Hardship without a compensating increase in quality and safety," for implementation of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Code Case N-885, "Alternative Requirements of Table IWB-2500-1, Examination Category B-N-1, Interior of Reactor Vessels, 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."

The licensee has requested to use this Code Case for Millstone Power Station, Units 2 and 3; North Anna Power Station, Units 1 and 2; Surry Power Station, Units 1 and 2; and Virgil C. Summer Nuclear Station, Unit 1.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), "Inservice inspection [ISI] requirement for operating plants," components (including supports) that are classified as ASME Code Class 1, Class 2, and Class

Enclosure

3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI of editions and addenda of the ASME BPV Code (or ASME OM Code for snubber examination and testing) that become effective subsequent to editions specified in paragraphs (g)(2) and (3) of this section and that are incorporated by reference in paragraph (a)(1)(ii) or (iv) for snubber examination and testing of this section, to the extent practical within the limitations of design, geometry, and materials of construction of the components. Components that are classified as Class MC pressure retaining components and their integral attachments, and components that are classified as Class CC pressure retaining components and their integral attachments, must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI of the ASME BPV Code and addenda that are incorporated by reference in paragraph (a)(1)(ii) of this section and the conditions listed in paragraphs (b)(2)(viii) and (ix) of this section, to the extent practical within the limitation of design, geometry, and materials of construction of the components.

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

Based on the above and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request and the Commission to authorize the alternatives requested by the licensee.

### 3.0 TECHNICAL EVALUATION

#### 3.1 ASME B&PV Code Componentets Affected

The components covered in this relief request are various accessible areas in reactor vessel interior components categorized under Examination Categories, B-N-1, B-N-2, and B-N-3, Item Numbers, B13.10, B13.50, B13.60, and B13.70 of the ASME Code, Section XI, Class 1.

#### ASME B&PV Code Requirements

The ASME code of record indicating the year of the Code Edition and the Addenda that are applicable to the licensee’s PWR nuclear operating units are included below.

Table 1: Applicable Code and Addenda

Plant	Interval	Edition and Addenda	Start	End
Surry Unit 1	Fifth	2004 Edition	December 14, 2013	October 13, 2023
Surry Unit 2	Fifth	2004 Edition	May,10, 2014	May 9, 2024
North Anna, Unit 1	Fifth	2013 Edition	May 1, 2019	April 30, 2029
North Anna, Unit 2	Fifth	2013 Edition	December 14, 2020	December 13, 2030
Millstone, Unit 2	Fifth	2013 Edition	April 1, 2020	March 31, 2030

Millstone, Unit 3	Fourth	2013 Edition	February 23, 2019	February 22, 2029
V.C. Summer	Fourth	2007, Edition, 2008 Addenda	January 1, 2014	December 31, 2023

Section XI, of ASME Code, IWB-2500(a), Table IWB-2500-1 (B-N-1, B-N-2, B-N-3) and IWB-3520, of the 2004 Edition, 2007 Edition with the 2008 Addenda, and the 2013 Edition provide requirements and acceptance standards for examining reactor vessel interior surfaces, reactor vessel interior attachments, and core support structures.

This Code Case would allow licensees to use alternatives from the current ASME Code, Section XI, IWB-2500(a), Table IWB-2500-1 (B-N-1, B-N-2, and B-N-3) and IWB-3520 requirements for performing VT-1 or VT-3 examination of the reactor vessel interior surfaces, reactor vessel interior attachments, and core support structures.

### 3.1.1 Licensee's Reasons for the Proposed Alternative to the ASME B&PV Code

In accordance with 10 CFR 50.55a(z)(2), the licensee proposed an alternative from the current ASME Code Section XI, IWB-2500(a), Table IWB-2500-1 (B-N-1, B-N-2, and B-N-3) and IWB-3520 requirements for performing VT-1 or VT-3 examination of the reactor vessel interior surfaces, reactor vessel interior attachments, and core support structures. The licensee stated that compliance with the ASME Code results in additional cost and radiation exposure and additional opportunity to introduce foreign material into the reactor vessel could result in additional outage critical path time that can be avoided through the use of Code Case N-885. The Electric Power Research Institute (EPRI) commissioned a study to assess the benefit and basis for performing Examination Category B-N-1, VT-3 examinations. The report identified that the purpose of B-N-1 examinations is to detect foreign material and debris and concluded that other industry requirements and guidance are sufficient for detecting foreign material and/or debris in the reactor vessel.

Table 2: Summary of Current ASME Code Section XI 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 Specifications for  
New Examination Category B-N

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

### 3.1.2 Proposed Alternative to the ASME B&PV Code

The licensee proposed to implement the requirements of ASME Code Case N-885 in lieu of the requirements of Section XI, IWB-2500(a), Table IWB-2500-1 (Examination Categories B-N-1, B-N-2, B-N-3), and IWB-3520.

The Code Case has eliminated Table IWB-2500-1 (B-N-1, B-N-2, B-N-3), Item number B13.10, VT-3 examinations and associated acceptance standards.

The current code technical requirements concerning Examination Category B-N-2 and B-N-3, Item Numbers B13.50, B13.60, and B13.70 examinations and associated acceptance standards are retained but with modified Examination Category and Item Number assignments in the code case.

### 3.1.3 Licensee Basis for use of the Code Case N-885

The licensee will perform the following activities as part of its technical bases to support the proposed alternative:

- Core Verification and Foreign Object Search and Retrieval (FOSAR) activities which is performed during refueling outages.
- Perform internals examinations performed during the period of extended operation per MRP-227, Revision 1-A, "Materials Reliability Program [MRP]: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines."
- Perform other ASME 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 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 NSSS [Nuclear Steam Supply System] or fuel supplier bulletin inspections.

### 3.1.4 Duration of the Proposed Alternative

The licensee stated that the proposed alternative for using Code Case N-885 at each plant addressed in the August 24, 2020, submittal will be applicable for the remainder of each plant's 10-year ISI interval as specified in Sections 7.0 and 3.0 of its submittal and Section 3.1 of this safety evaluation or such time as the NRC approves the Code Case N-885 in Regulatory Guide 1.147 or other document.

### 3.2 NRC Staff Evaluation

The NRC staff reviewed the licensee's submittal dated August 24, 2020, as supplemented by letter dated March 3, 2021, which included the proposed implementation of ASME Code, Section XI, Code Case N-885, for the ASME Code, Section XI, ISI examinations of the reactor vessel Internals (RVI) components at the subject plants. This Code Case would allow the use of alternatives from the current ASME Code, Section XI, IWB-2500(a), Table IWB-2500-1 (B-N-1, B-N-2, and B-N-3) and IWB-3520 requirements for performing VT-1 or VT-3 examination of the reactor vessel interior surfaces, reactor vessel interior attachments, and core support structures. Code Case N-885 has eliminated Table IWB-2500-1 (B-N-1, B-N-2, B-N-3), Item Number B13.10, VT-3 examinations and associated acceptance standards. The NRC staff notes that the current code technical requirements concerning Examination Category B-N-2 and B-N-3, Item Numbers B13.50, B13.60, and B13.70 examinations and associated acceptance standards are retained but with modified Examination Category and Item Number assignments.

#### 3.2.1 NRC Staff's Review of the Licensee's Technical Bases

For the subject facilities, the proposed alternative would allow the licensee to eliminate the examinations currently required by the ASME Code, Section XI, for Examination Category B-N-1. Specifically, the licensee would no longer be required to perform the VT-3 visual examinations of the reactor vessel interior (current Item No. B13.10) each inspection period. In a supplemental response dated March 3, 2021, the licensee clarified that deletion of the VT-3 examination and the associated acceptance criteria are only applicable to vessel interior surfaces which are binned under B-N-1 Category.

In its review of the licensee's technical basis for implementing Code Case N-885, the NRC staff noted that the licensee's decision to eliminate VT-3 inspections of vessel interiors during the refueling outages was based on the following activities which are performed routinely during each outage: (1) FOSAR activities; (2) Core verification activities; (3) Routine refueling activities; (4) Maintenance activities, component movement during the refueling outages, fuel supplier bulletin inspections, and industry's recommended inspections; (5) ASME Code, Section XI, ISI of B-A, B-D, B-N-2 and B-N-3 Categories; (6) RVI components in PWRs are inspected per NRC staff approved MRP-227, Revision 1. The NRC staff's evaluation of these items is addressed below.

### 3.2.2 Evaluation of Alternatives

FOSAR activities are performed during every refueling outage and these activities provide ample opportunity to verify the conditions of the vessel interiors. In addition, presence of a foreign object, debris and any abnormal or adverse conditions would be expected to be identified, and corrective actions will be taken in accordance with plant procedures before closing the reactor vessel head. These activities are performed using VT-3 inspection methods. Corrective actions will meet the quality assurance program addressed in Title 10 of the *Code of Federal Regulation* (CFR) Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Processing Plants."

In addition to rigorous foreign material exclusion controls, core verification activities also occur during the refueling outages. These activities are more frequent than the ASME Code required inspections. Any presence of a foreign object or debris would be identified during these activities. The licensee indicated that FOSAR, core verification, and other refueling outage activities provide more frequent opportunities to detect foreign materials and accumulation of corrosion products than the examinations for the current Examination Categories B-N-2 and B-N-3. The NRC staff considers that these programs would have a high likelihood to detect and correct foreign objects or debris and identify other adverse conditions that could interfere with control rod motion or could result in blockage of coolant flow paths.

Given the scope of the VT-3 visual examinations for the current Examination Categories B-N-2 and B-N-3, the NRC staff understands that these examinations are not likely to identify foreign materials or accumulation of corrosion products that could interfere with control rod motion or could result in blockage of coolant flow through fuel. The NRC staff considers that the licensee's FOSAR, core verification, and other refueling outage activities provide a much more effective means of detecting foreign materials and accumulation of corrosion products within the reactor vessel than these VT-3 examinations. Acceptance criterion addressed in IWB-3520.2 (c) of the ASME Code, Section XI, related to VT-3 examination states that "foreign materials or accumulation of corrosion products could interfere with control rod motion or could result in blockage of coolant flow through the fuel."

This criterion was not deleted for VT-3 examinations of components binned under Categories B-N-2 and B-N-3, FOSAR and core verification activities in the proposed alternative. Based on these considerations, the NRC staff determined that the licensee's FOSAR, core verification, and other refueling outage activities provide a much more effective means of detecting foreign materials and accumulation of corrosion products within the reactor vessel than the deleted VT-3 visual examinations of vessel interior surfaces binned under B-N-1 Category in the ASME Code, Section XI. Therefore, the NRC staff has reasonable assurance that the licensee would 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.

Routine refueling activities provide opportunities to identify any adverse conditions in the reactor vessel interiors. Opportunities to inspect vessel interior surfaces are also facilitated by the maintenance activities, component movement during the refueling outages, fuel supplier bulletin inspections, and industry's recommended inspections. In addition, RVI components are inspected in accordance with the ASME Code, Section XI, ISI of B-A, B-D, B-N-2 and B-N-3 Categories. RVI components in PWRs are inspected per NRC staff approved MRP-227, Revision 1.



Based on the above, the NRC staff concludes that the status of the reactor vessel interiors are frequently monitored by the plant personnel and if there were to be any adverse conditions on the vessel interior surface, it will be identified during these activities. In addition, an adverse condition in the vessel could potentially provide telltale signs to the plant personnel, so that proper corrective actions can be taken in a timely manner.

Therefore, the NRC staff concludes that implementation of Code Case N-885, in lieu of the existing Code requirement of the inspections of the vessel interior surfaces does not compromise the quality and the safety of these surfaces. In addition, implementation of Code Case N-885 reduces extra hardship for the licensee and unnecessary exposure to radiation to the plant personnel. The NRC staff's conclusions are based on the following observations:

- (1) Routine inspections of the vessel interior attachments (B-N-2, Items B13.50 and B13.60) and removable core support structures (B-N-3, Item B13.70), provide reasonable assurance that the vessel interior surfaces located closer to these components would be monitored from time to time, and,
- (2) FOSAR and Core Verification activities entail monitoring of the vessel interior surfaces of the surrounding areas which is more effective than the activity associated with ASME Code, Section XI, B-N-1, Item B13.10, VT-3 inspections. Since both these activities are focused on the vessel interior inspections, they can provide similar results revealing the status of vessel interior surface. Therefore, it can be ascertained that the deletion of the ASME Code, Section XI, B-N-1, Item B13.10, VT-3 inspections (as addressed in Code Case N-885) does not compromise quality and safety.

Based on the preceding analysis the NRC staff finds that, given the elimination of the B-N-1 requirements, there remains adequate programmatic controls to detect and correct foreign objects or debris and identify other adverse conditions that could interfere with control rod motion or could result in blockage of coolant flow paths.

#### 4.0 CONCLUSION

As set forth above, the NRC staff has determined that implementation of Code Case N-885 as an alternative to the existing ASME Code requirement of the inspections of the vessel interior surfaces provides reasonable assurance of integrity of the vessel interior surfaces. The NRC staff noted that the staff determined that this submittal should be approved under the provisions 10 CFR Part 50a(z)(1). Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of the proposed alternative for the remainder of each plant's ten-year ISI interval as addressed in Section 3.0 of the August 24, 2020 submittal.

The NRC approval of this alternative for Dominion does not imply or infer the NRC approval of Code Case N-885 for generic use.

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

Principal Contributor: G. Cheruvenki, NRR

Date: March 26, 2021

SUBJECT: MILLSTONE POWER STATION, UNIT NOS. 2 AND 3, NORTH ANNA POWER STATION, UNIT NOS. 1 AND 2, SURRY POWER STATION, UNIT NOS. 1 AND 2, AND VIRGIL C. SUMMER NUCLEAR STATION, UNIT NO. 1 –  
RE: REQUEST TO UTILIZE CODE CASE N-885 (EPID L-2020-LLR-0115)  
DATED MARCH 26, 2021

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