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October 31, 2019

**Ms. Louise Lund, Director  
Division of Engineering  
Office of Research  
Mail Stop T10-A36  
Nuclear Regulatory Commission  
Washington, DC 20555-0001**

**Subject: ASME Request for Endorsement of Section XI, Division 2 and Section XI, Division 1, Nonmandatory Appendix R**

**References:** 1. ASME Boiler and Pressure Vessel Code, Section XI, Division 1, Nonmandatory Appendix R, 2019 Edition  
2. ASME Boiler and Pressure Vessel Code, Section XI, Division 2, 2019 Edition

Dear Ms. Lund,

The purpose of this letter is to request that the NRC take regulatory action to endorse both Section XI, Division 1, Nonmandatory Appendix R and Section XI, Division 2 for reasons outlined below.

10 CFR 50.55a(a)(1)(ii) incorporates by reference the ASME Boiler and Pressure Vessel Code, Section XI, Division 1, subject to the conditions in 10 CFR 50.55a(b)(2). 10 CFR 50.55a(b)(2) (xxix) states that Nonmandatory Appendix R, "Risk-Informed Inspection Requirements for Piping," of Section XI, 2005 Addenda through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of this section, may not be implemented without prior NRC authorization of the proposed alternative in accordance with 10 CFR 50.55a(z). ASME requests that the NRC remove this condition so that licensees may use Nonmandatory Appendix R without having to seek regulatory authorization in accordance with 10 CFR 50.55a(z).

10 CFR 50.55a does not address ASME Section XI, Division 2, which was first published July 1, 2019. ASME requests that the NRC take action to endorse Section XI, Division 2 in 10 CFR 50.55a.

### **Section XI, Division 2**

ASME developed and published Section XI, Division 2 (2019 Edition), Requirements for Reliability and Integrity Management (RIM) Programs for Nuclear Power Plants, for the following reasons.

1. The RIM Program is a new paradigm for the construction of nuclear power plants. It eliminates the current two-step construction process; a) design and construction in

accordance with Section III, and b) preservice examinations and tests in accordance with Section XI, Division 1. The RIM Program requires that inservice examination and test requirements be incorporated into the design specifications for the construction of the new plant. Division 2 includes Mandatory Appendix VII, which includes supplements that provide specific requirements for different plant types. Additional supplements will be added to address new plant designs as they are developed, and ASME has recently added supplements for Fusion Machines, and Generation 2 Plants for 60-80 year life extension (requested by an NRC staff member of the RIM Committee). The following is a list of Mandatory Appendix VII supplements for various plant types:

- Article VII-1, Supplement for Light Water Reactor-Type Plants (Complete)
  - Article VII-2, Supplement for Liquid Metal Reactor-Type Plants (In Course of Preparation – Completion Expected for Publication in the 2021 Edition)
  - Article VII-3, Supplement for High-Temperature Gas Reactor-Type Plants (Complete)
  - Article VII-4, Supplement for Molten Salt Reactor-Type Plants (In Course of Preparation)
  - Article VII-5, Supplement for Generation 2 LWR Reactor-Type Plants (In Course of Preparation – Completion Expected for Publication in the 2023 Edition)
  - Article VII-6, Supplement for Fusion Machine-Type Plants (In Course of Preparation – Completion Expected for Publication in the 2021 Edition)
2. ASME is aware that the NRC staff is currently writing Standard Review Plans for many of these new plants and hopes that NRC endorsement of Section XI, Division 2 will assist in the design, construction, inspection, testing, and maintenance of these plants.
  3. Many stakeholders are currently developing new reactor designs that are distinctly different from the large light-water reactors currently operating in the U.S. Many of these new designs are for small modular reactors. These new designs are so different from existing plants that application of Section XI, Division 1 is impractical or technically inappropriate. ASME believes that most stakeholders in the nuclear industry would prefer to have a standardized set of requirements for the design, construction, and inservice inspection for these new plants. The RIM Program includes flexibility for Owners to implement alternative strategies for maintaining the reliability of structures, systems, and components (SSCs), and is particularly suited for plant designs for which access might be difficult for performing nondestructive examination (NDE).
  4. The stakeholders for these new plants need to establish inservice inspection requirements that balance the costs with the safety benefits resulting from these inspections. For this reason, the RIM Program uses risk-informed insights to determine inservice inspection requirements that will help to improve the availability and reliability of pressure-retaining equipment necessary for ensuring plant safety and the health and safety of the public and plant workers.
  5. To support this effort, the RIM Program requires compliance with ASME/ANS RA-S-1.4, Probabilistic Risk Assessment Standards for Advanced Non-LWR for Nuclear Power Plants, which was written to support the RIM Program and is the most advanced

standard written for probabilistic risk assessment (PRA). Using this PRA and other risk tools in the RIM Program, each structure, system, and component (SSC) will be reviewed and assigned a Reliability Target (RT) that is maintained throughout the life of the plant. RIM strategies are developed to ensure that the SSC reliability targets are maintained throughout the plant life. These strategies include design and material selection, fabrication procedures, operating practices, preservice and inservice examinations, testing, monitoring and NDE, maintenance, and repair/replacement practices. The RIM Program uses a RIM Expert Panel to determine SSC RIM strategies.

6. NDE is critical to the RIM Program, and the RIM Program is the first ASME Code to endorse the use of ASME ANDE-1, ASME Nondestructive Examination and Quality Control Central Qualification and Certification Program. The RIM Program uses a Monitoring and NDE Expert Panel (MANDEEP) that is responsible for controlling NDE procedures for both construction and inservice inspection and monitoring requirements, including procedure revisions that could affect the probability of detection (POD) and RIM Reliability Targets. All NDE procedures used in the RIM Program will be "performance based," a criterion the NRC staff has long desired for inclusion in Section XI, Division 1. Use of online NDE and monitoring is addressed in the RIM Program, and includes requirements for acoustic emission monitoring in accordance with Section V, Article 13, Continuous Acoustic Emission Monitoring of Pressure Boundary Components.

Because the ASME believes Section XI, Division 2 is of significant benefit to the industry and is needed for standardizing inservice inspection of new reactor designs; the ASME encourages the NRC to endorse Section XI, Division 2.

### **Section XI, Division 1, Nonmandatory Appendix R**

Nonmandatory Appendix R, Risk-Informed Inspection Requirements for Piping, incorporated the risk-informed selection and examination provisions of ASME Code Cases N-560, N-577, and N-578 into Section XI, Division 1. It is specifically permitted by Division 1 as an alternative to the deterministic selection and examination requirements of Subsections IWB and IWC for a subset of Class 1 and 2 inspection requirements. It may also be used for Class 3 and non-Class components, to add risk-informed examination requirements thereby increasing plant safety.

All U.S. licensees and many overseas nuclear power plant owners have already implemented various risk-informed alternative provisions to ASME deterministic requirements. All of the U.S. applications of risk-informed inservice inspection have been overseen and approved by the NRC. ASME believes the industry has sufficient experience in implementing these programs that it is appropriate for the NRC to endorse the alternative provisions of Appendix R. It is noted that NRC has already endorsed ASME Code Case N-716-1 (streamlined RI-ISI) in Regulatory Guide 1.147.

Nonmandatory Appendix R provides two separate methodologies for performing risk-informed applications in Supplements 1 and 2. Supplement 1 incorporates the criteria of Code Case N-577, while Supplement 2 addresses the methodologies that formed the bases for Code Cases N-560 and N-578. Both supplements have been updated by ASME Section XI on an ongoing basis to incorporate lessons learned from risk-informed applications. In addition, the principles and practices established in Supplement 2 served as a basis for Code Case N-716-1. As such, the review and approval of Supplement 2 of Nonmandatory Appendix R might be a good

starting point for the regulatory evaluation, because Code Case N-716-1 is already approved by the NRC.

For the above reasons, ASME requests that the NRC remove or modify the condition in 10 CFR 50.55a(b)(2)(xxix) to allow use of Nonmandatory Appendix R without requiring prior NRC authorization in accordance with §50.55a(z).

ASME would like to thank the NRC for considering this request to endorse Section XI, Division 2 and Section XI, Division 1, Nonmandatory Appendix R in the next draft revision to 10 CFR 50.55a. ASME believes that both the nuclear industry and the NRC will benefit from having these provisions available for use at the earliest opportunity.

Please provide a response to these requests. ASME would like very much to know if the NRC can accept these requests and begin the endorsement process, or if the NRC has any additional concerns or questions, or if the NRC needs any additional information or any changes to the Code provisions for which ASME is requesting endorsement.

If you have any questions in regard to the contents of this letter, please direct them to Mr. Christian Sanna, Director, ASME Nuclear Codes & Standards by telephone (212) 591-8513 or by e-mail [SannaC@asme.org](mailto:SannaC@asme.org).

Very truly yours,

A handwritten signature in black ink, appearing to read 'Richard Porco', written in a cursive style.

Richard Porco, Chair  
ASME Board on Nuclear Codes and Standards

cc: Officers, ASME Council on Standards and Certification  
Officers, ASME Board on Nuclear Codes and Standards  
Officers, ASME BPV Committee on Nuclear Inservice Inspection (XI)