[7590-01-P]

NUCLEAR REGULATORY COMMISSION

10 CFR Part 50

[NRC-2016-0082]

RIN 3150-AJ74

American Society of Mechanical Engineers 2015-2017 Code Editions Incorporation by Reference

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is proposing to amend its regulations to incorporate by reference the 2015 and 2017 Editions of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (BPV Code) and the 2015 and 2017 Editions of the ASME *Operation and Maintenance of Nuclear Power Plants*, Division 1: OM: Section IST (OM Code), respectively, for nuclear power plants. The NRC is also proposing to incorporate by reference two revised ASME code cases. This action is in accordance with the NRC's policy to periodically update the regulations to incorporate by reference new editions of the ASME Codes and is intended to maintain the safety of nuclear power plants and to make NRC activities more effective and efficient.

DATES: Submit comments by **January 23, 2019**. Comments received after this date will be considered if it is practical to do so, but the NRC is able to ensure consideration only for comments received on or before this date.

ADDRESSES: You may submit comments by any of the following methods (unless this document describes a different method for submitting comments on a specific subject):

- **Federal Rulemaking Web Site**: Go to http://www.regulations.gov and search for Docket ID NRC-2016-0082. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; e-mail: Carol.Gallagher@nrc.gov. For technical questions contact the individuals listed in the FOR FURTHER INFORMATION CONTACT section of this document.
- **Email comments to**: Rulemaking.Comments@nrc.gov. If you do not receive an automatic email reply confirming receipt, then contact us at 301-415-1677.
- **Fax comments to**: Secretary, U.S. Nuclear Regulatory Commission at 301-415-1101.
- **Mail comments to**: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, ATTN: Rulemakings and Adjudications Staff.
- **Hand deliver comments to**: 11555 Rockville Pike, Rockville, Maryland 20852, between 7:30 a.m. and 4:15 p.m. (Eastern Time) Federal workdays; telephone: 301-415-1677.

For additional direction on obtaining information and submitting comments, see "Obtaining Information and Submitting Comments" in the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: James G. O'Driscoll, Office of Nuclear Material Safety and Safeguards, telephone: 301-415-1325, email: James.O'Driscoll@nrc.gov; or Keith Hoffman, Office of Nuclear Reactor Regulation, telephone: 301-415-1294, email: Keith.Hoffman@nrc.gov. Both are staff of the U.S. Nuclear Regulatory Commission,

Washington, DC 20555-0001.

SUPPLEMENTARY INFORMATION:

EXECUTIVE SUMMARY:

A. Need for the Regulatory Action

The NRC is proposing to amend its regulations to incorporate by reference the 2015 and 2017 Editions of the ASME BPV Code and the 2015 and 2017 Editions of the ASME OM Code, respectively, for nuclear power plants. The NRC is also proposing to incorporate by reference two ASME code cases.

This proposed rule is the latest in a series of rulemakings to amend the NRC's regulations to incorporate by reference revised and updated ASME Codes for nuclear power plants. The ASME periodically revises and updates its codes for nuclear power plants by issuing new editions, and this rulemaking is in accordance with the NRC's policy to update the regulations to incorporate those new editions into the NRC's regulations. The incorporation of the new editions will maintain the safety of nuclear power plants, make NRC activities more effective and efficient, and allow nuclear power plant licensees and applicants to take advantage of the latest ASME Codes. The ASME is a voluntary consensus standards organization, and the ASME Codes are voluntary consensus standards. The NRC's use of the ASME Codes is consistent with applicable requirements of the National Technology Transfer and Advancement Act (NTTAA). Additional discussion of voluntary consensus standards and the NRC's compliance with the NTTAA is set forth in Section VIII of this document, "Voluntary Consensus Standards."

B. Major Provisions.

Major provisions of this proposed rule include:

- Incorporation by reference of ASME Codes (2015 and 2017 Editions of the BPV Code and the OM Code) into NRC regulations and delineation of NRC requirements for the use of these codes, including conditions.
- Incorporation by reference of two revised ASME Code Cases and delineation of NRC requirements for the use of these code cases, including conditions.
- Incorporation by reference of Electric Power Research Institute (EPRI), Materials Reliability Project (MRP) Topical Report, "Materials Reliability Program: Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement" (MRP-335, Revision 3-A), which provides requirements for the mitigation of primary water stress corrosion cracking (PWSCC) on Reactor Vessel Head penetrations and Dissimilar Metal Butt Welds.

C. Costs and Benefits.

The NRC prepared a draft regulatory analysis to determine the expected costs and benefits of this proposed rule. The regulatory analysis identifies costs and benefits in both a quantitative fashion as well as in a qualitative fashion.

The analysis concludes that this proposed rule would result in a net quantitative averted cost to the industry and the NRC. This proposed rule, relative to the regulatory baseline, would result in a net averted cost for industry of $3.64 million based on a 7 percent net present value (NPV) and $4.17 million based on a 3 percent NPV. The estimated incremental industry averted cost per reactor unit ranges from $37,900 based on a 7 percent NPV to $43,300 based

on a 3 percent NPV. The NRC benefits from the proposed rulemaking alternative because of the averted cost of not reviewing and approving Code alternative requests on a plant-specific basis under § 50.55a(z) of title 10 of the *Code of Federal Regulations* (10 CFR). The NRC net benefit ranges from $2.81 million based on a 7 percent NPV to $3.49 million based on a 3 percent NPV.

Qualitative factors that were considered include regulatory stability and predictability, regulatory efficiency, and consistency with the NTTAA. Table 38 in the draft regulatory analysis includes a discussion of the costs and benefits that were considered qualitatively. If the results of the regulatory analysis were based solely on quantified costs and benefits, then the regulatory analysis would show that the rulemaking is justified because the total quantified benefits of the proposed regulatory action do not equal or exceed the costs of the proposed action. Further, if the qualitative benefits (including the safety benefit, cost savings, and other non-quantified benefits) are considered together with the quantified benefits, then the benefits outweigh the identified quantitative and qualitative impacts.

With respect to regulatory stability and predictability, the NRC has had a decades-long practice of approving and/or mandating the use of certain parts of editions and addenda of these ASME Codes in § 50.55a through the rulemaking process of "incorporation by reference." Retaining the practice of approving and/or mandating the ASME Codes continues the regulatory stability and predictability provided by the current practice. Retaining the practice also assures consistency across the industry, and provides assurance to the industry and the public that the NRC will continue to support the use of the most updated and technically sound techniques developed by the ASME to provide adequate protection to the public. In this regard, the ASME Codes are voluntary consensus standards developed by participants with broad and varied interests and have undergone extensive external review before being reviewed by the NRC. Finally, the NRC's use of the ASME Codes is consistent

with the NTTAA, which directs Federal agencies to adopt voluntary consensus standards instead of developing "government-unique" (i.e., Federal agency-developed) standards, unless inconsistent with applicable law or otherwise impractical.

For more information, please see the draft regulatory analysis (Accession No. ML18150A267 in the NRC's Agencywide Documents Access and Management System (ADAMS)).

TABLE OF CONTENTS:

I. Obtaining Information and Submitting Comments

A. Obtaining Information

Please refer to Docket ID NRC-2016-0082 when contacting the NRC about the availability of information for this proposed rule. You may obtain information related to this proposed rule by any of the following methods:

- **Federal Rulemaking Web site:** Go to http://www.regulations.gov and search for Docket ID NRC-2016-0082.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly-available documents online in the ADAMS Public Documents collection at http://www.nrc.gov/reading-rm/adams.html. To begin the search, select "ADAMS Public Documents" and then select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to pdr.resource@nrc.gov. For the convenience of the reader, instructions about obtaining materials referenced in this document are provided in the "Availability of Documents" section.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

B. Submitting Comments

Please include Docket ID NRC-2016-0082 in your comment submission.

The NRC cautions you not to include identifying or contact information that you do not want to be publicly disclosed in your comment submission. The NRC will post all comment submissions at http://www.regulations.gov as well as enter the comment submissions into ADAMS. The NRC does not routinely edit comment submissions to remove identifying or contact information.

If you are requesting or aggregating comments from other persons for submission to the NRC, then you should inform those persons not to include identifying or contact information that they do not want to be publicly disclosed in their comment submission. Your request

should state that the NRC does not routinely edit comment submissions to remove such information before making the comment submissions available to the public or entering the comment into ADAMS.

II. Background

The ASME develops and publishes the ASME BPV Code, which contains requirements for the design, construction, and inservice inspection (ISI) of nuclear power plant components; and the ASME OM Code,[1] which contains requirements for inservice testing (IST) of nuclear power plant components. Until 2012, the ASME issued new editions of the ASME BPV Code every 3 years and addenda to the editions annually, except in years when a new edition was issued. Similarly, the ASME periodically published new editions and addenda of the ASME OM Code. Starting in 2012, the ASME decided to issue editions of its BPV and OM Codes (no addenda) every 2 years with the BPV Code to be issued on the odd years (e.g., 2013, 2015, etc.) and the OM Code to be issued on the even years[2] (e.g., 2012, 2014, etc.). The new editions and addenda typically revise provisions of the Codes to broaden their applicability, add specific elements to current provisions, delete specific provisions, and/or clarify them to narrow the applicability of the provision. The revisions to the editions and addenda of the Codes do not significantly change Code philosophy or approach.

The NRC's practice is to establish requirements for the design, construction, operation, ISI (examination), and IST of nuclear power plants by approving the use of editions and addenda of the ASME BPV and OM Codes (ASME Codes) in § 50.55a. The NRC approves or

[1] The editions and addenda of the ASME *Code for Operation and Maintenance of Nuclear Power Plants* have had different titles from 2005 to 2017 and are referred to collectively in this rule as the "OM Code."
[2] The 2014 Edition of the ASME OM Code was delayed and was designated the 2015 Edition. Similarly, the 2016 Edition of the OM Code was delayed and was designated the 2017 Edition.

mandates the use of certain parts of editions and addenda of these ASME Codes in § 50.55a through the rulemaking process of "incorporation by reference." Upon incorporation by reference of the ASME Codes into § 50.55a, the provisions of the ASME Codes are legally-binding NRC requirements as delineated in § 50.55a, and subject to the conditions on certain specific ASME Codes' provisions that are set forth in § 50.55a. The editions and addenda of the ASME BPV and OM Codes were last incorporated by reference into the NRC's regulations in a final rule dated July 18, 2017 (82 FR 32934).

The ASME Codes are consensus standards developed by participants with broad and varied interests (including the NRC and licensees of nuclear power plants). The ASME's adoption of new editions of, and addenda to, the ASME Codes does not mean that there is unanimity on every provision in the ASME Codes. There may be disagreement among the technical experts, including the NRC's representatives on the ASME Code committees and subcommittees, regarding the acceptability or desirability of a particular Code provision included in an ASME-approved Code edition or addenda. If the NRC believes that there is a significant technical or regulatory concern with a provision in an ASME-approved Code edition or addenda being considered for incorporation by reference, then the NRC conditions the use of that provision when it incorporates by reference that ASME Code edition or addenda. In some instances, the condition increases the level of safety afforded by the ASME Code provision, or addresses a regulatory issue not considered by the ASME. In other instances, where research data or experience has shown that certain Code provisions are unnecessarily conservative, the condition may provide that the Code provision need not be complied with in some or all respects. The NRC's conditions are included in § 50.55a, typically in paragraph (b) of that section. In a Staff Requirements Memorandum (SRM) dated September 10, 1999, the Commission indicated that NRC rulemakings adopting (incorporating by reference) a voluntary consensus standard must identify and justify each part of the standard that is not adopted. For

this rulemaking, the provisions of the 2015 and 2017 Editions of Section III, Division 1; and the 2015 and 2017 Editions of Section XI, Division 1, of the ASME BPV Code; and the 2015 and 2017 Editions of the ASME OM Code that the NRC is not adopting, or is only partially adopting, are identified in the Discussion, Regulatory Analysis, and Backfitting and Issue Finality sections of this document. The provisions of those specific editions and code cases that are the subject of this proposed rule that the NRC finds to be conditionally acceptable, together with the applicable conditions, are also identified in the Discussion, Regulatory Analysis, and Backfitting and Issue Finality sections of this document.

The ASME Codes are voluntary consensus standards, and the NRC's incorporation by reference of these Codes is consistent with applicable requirements of the NTTAA. Additional discussion on the NRC's compliance with the NTTAA is set forth in Section VIII of this document, "Voluntary Consensus Standards."

III. Discussion

The NRC follows a three-step process to determine acceptability of new provisions in new editions to the Codes and the need for conditions on the uses of these Codes. This process was employed in the review of the Codes that are the subjects of this proposed rule. First, the NRC staff actively participates with other ASME committee members with full involvement in discussions and technical debates in the development of new and revised Codes. This includes a technical justification of each new or revised Code. Second, the NRC's committee representatives discuss the Codes and technical justifications with other cognizant NRC staff to ensure an adequate technical review. Third, the NRC position on each Code is reviewed and approved by NRC management as part of this proposed rule amending § 50.55a to incorporate by reference new editions of the ASME Codes and conditions on their use. This regulatory process, when considered together with the ASME's own process for

developing and approving the ASME Codes, provides reasonable assurance that the NRC approves for use only those new and revised Code edition and addenda, with conditions as necessary, that provide reasonable assurance of adequate protection to the public health and safety, and that do not have significant adverse impacts on the environment.

The NRC reviewed changes to the Codes in the editions identified in this proposed rule. The NRC concluded, in accordance with the process for review of changes to the Codes, that these editions of the Codes, are technically adequate, consistent with current NRC regulations, and approved for use with the specified conditions upon the conclusion of the rulemaking process.

The NRC is proposing to amend its regulations to incorporate by reference:

- The 2015 and 2017 Editions to the ASME BPV Code, Section III, Division 1 and Section XI, Division 1, with conditions on their use.
- The 2015 and 2017 Editions to Division 1 of the ASME OM Code, with conditions on their use.
- ASME BPV Code Case N-729-6, “Alternative Examination Requirements for PWR [Pressurized Water Reactor] Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1,” ASME approval date: March 3, 2016, with conditions on its use.
- ASME BPV Code Case N-770-5, “Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities, Section XI, Division 1,” ASME approval date: November 7, 2016, with conditions on its use.

- “Materials Reliability Program: Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement” (MRP-335, Revision 3-A), EPRI approval date: November 2016.

The current regulations in § 50.55a(a)(1)(i) incorporate by reference ASME BPV Code, Section III, 1963 Edition through the 1970 Winter Addenda; and the 1971 Edition (Division 1) through the 2013 Edition (Division 1), subject to the conditions identified in current § 50.55a(b)(1)(i) through (b)(1)(ix). This proposed rule would revise § 50.55a(a)(1)(i) to incorporate by reference the 2015 and 2017 Editions (Division 1) of the ASME BPV Code, Section III.

The current regulations in § 50.55a(a)(1)(ii) incorporate by reference ASME BPV Code, Section XI, 1970 Edition through the 1976 Winter Addenda; and the 1977 Edition (Division 1) through the 2013 Edition (Division 1), subject to the conditions identified in current § 50.55a(b)(2)(i) through (b)(2)(xxix). This proposed rule would revise § 50.55a(a)(1)(ii) to remove exclusions from the incorporation by reference of specific paragraphs of the 2011a Addenda and the 2013 Edition of ASME BPV Code, Section XI, as explained in this document. This proposed rule would also revise § 50.55a(a)(1)(ii) to incorporate by reference 2015 and 2017 Editions (Division 1) of the ASME BPV Code, Section XI. It would also clarify the wording and add, remove, or revise some of the conditions as explained in this document.

The current regulations in § 50.55a(a)(1)(iv) incorporate by reference ASME OM Code, 1995 Edition through the 2012 Edition, subject to the conditions currently identified in § 50.55a(b)(3)(i) through (b)(3)(xi). This proposed rule would revise § 50.55a(a)(1)(iv) to incorporate by reference the 2015 and 2017 Editions of Division 1 of the ASME OM Code. As a result, the NRC regulations would incorporate by reference in § 50.55a the 1995 Edition through the 2017 Edition of the ASME OM Code.

In the introduction discussion of its Codes, ASME specifies that errata to those Codes may be posted on the ASME Web site under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in those Codes. ASME notes that an option is available to automatically receive an e-mail notification when errata are posted to a Code. Users of the ASME BPV Code and ASME OM Code should be aware of errata when implementing the specific provisions of those Codes.

The proposed regulations in § 50.55a (a)(4) would include the Electric Power Research Institute, Materials Reliability Program, 3420 Hillview Avenue, Palo Alto, CA 94304-1338; telephone: 1-650-855-200; http://www.epri.com, as a new source of documentation to be incorporated by reference in § 50.55a.

Each of the proposed NRC conditions and the reasons for each proposed condition are discussed in the following sections of this document. The discussions are organized under the applicable ASME Code and Section.

A. ASME BPV Code, Section III

10 CFR 50.55a(a)(1)(E) Rules for Construction of Nuclear Facility Components-Division 1

The NRC proposes to revise § 50.55a(a)(1)(i)(E) to incorporate by reference the 2015 and 2017 Editions of the ASME BPV Code, Section III, including Subsection NCA and Division 1 Subsections NB through NH (for the 2015 Edition) and Subsections NB through NG (for the 2017 Edition) and Appendices. As stated in § 50.55a(a)(1)(i), the Nonmandatory Appendices are excluded and not incorporated by reference. The Mandatory Appendices are incorporated by reference because they include information necessary for Division 1. However, the Mandatory Appendices also include material that pertains to other Divisions that have not been reviewed and approved by the NRC. Although this information is included in the sections and appendices being incorporated by reference, the NRC notes that the use of Divisions other

than Division 1 has not been approved, nor are they required by NRC regulations and, therefore, such information is not relevant to current applicants and licensees. Therefore, this proposed rule would clarify that current applicants and licensees may only use the sections of the Mandatory Appendices that pertain to Division 1. The NRC is not taking a position on the non-Division 1 information in the appendices and is including it in the incorporation by reference only for convenience.

10 CFR 50.55a(b)(1)(v) Section III condition: Independence of Inspection

The 1995 Edition through the 2009b Addenda of the 2007 Edition of ASME BPV Code, Section III, Subsection NCA, endorsed the NQA-1-1994 Edition in NCA-4000, "Quality Assurance." Paragraph (a) of NCA-4134.10, "Inspection," states, "The provisions of NQA-1 Basic Requirement 10 and Supplement 10S-1, shall apply, except for paragraph 3.1, and the requirements of Inservice Inspection." Paragraph 3.1, "Reporting Independence," of Supplement 10S-1, of NQA-1, states, "Inspection personnel shall not report directly to the immediate supervisors who are responsible for performing the work being inspected." In the 2010 Edition through the latest ASME BPV Code Editions of NCA, the Code removed the paragraph 3.1 exception for reporting independence.

Based on the above changes to the Code, the NRC is proposing to revise the condition to reflect that this condition is applicable only for the 1995 Edition through 2009b Addenda of the 2007 Edition, where the NQA-1-1994 Edition is referenced.

10 CFR 50.55a(b)(1)(vi) Section III condition: Subsection NH

The NRC proposes to revise this existing condition since Subsection NH of Section III Division 1 no longer exists in the 2017 Edition of ASME BPV Code, Section III Division 1. The change is to reflect that Subsection NH existed from the 1995 Addenda through 2015 Edition of

Section III Division 1. In 2015, Subsection NH contents also were included in Section III Division 5 Subpart B. In the 2017 Edition of the ASME Code, Subsection NH was deleted from Division 1 of Section III and became part of Division 5 of Section III. Division 5 of Section III is not incorporated by reference in § 50.55a. Therefore, the NRC proposes to revise the condition to make it applicable to the 1995 Addenda through all Editions and addenda up to and including the 2013 Edition.

10 CFR 50.55a(b)(1)(x) Section III condition: Visual examination of bolts, studs, and nuts

The visual examination is one of the processes for acceptance of a bolt, stud or nut to ensure its structural integrity and its ability to perform its intended function. The 2015 Edition of the ASME Code contains this requirement, however the 2017 Edition does not require these visual examinations to be performed in accordance with NX-5100 and NX-5500. Therefore, the NRC proposes to add two conditions to ensure adequate procedures remain and qualified personnel remain capable of determining the structural integrity of these components.

10 CFR 50.55a(b)(1)(x) Section III condition: Visual examination of bolts, studs, and nuts, First provision

The NRC is adding § 50.55a(b)(1)(x) to condition the provisions of NB-2582, NC-2582, ND-2582, NE-2582, NF-2582, NG-2582 in the 2017 Edition of Section III. The condition is that the visual examinations are required to be performed in accordance with procedures qualified to NB-5100, NC-5100, ND-5100, NE-5100, NF-5100, and NG-5100, and personnel qualified to NB-5500, NC-5500, ND-5500, NE-5500, NF-5500, and NG-5500, respectively. The 2015 Edition of the ASME Code contains this requirement. The visual examination is one of the processes for acceptance of the final product to ensure its structural integrity and its ability to perform its intended function. The 2017 Edition does not require these visual examinations to be performed in accordance with NX-5100 and NX-5500. All other final examinations (MT, PT,

UT and RT) for acceptance of the final product in the 2017 Edition require the procedures and personnel to be qualified to NX-5100 and NX-5500.

Therefore, the NRC proposes to add § 50.55a(b)(1)(x)(A) to condition the provisions of NB-2582, NC-2582, ND-2582, NE-2582, NF-2582,and NG-2582 in the 2017 Edition of Section III to require that procedures are qualified to NB-5100, NC-5100, ND-5100, NE-5100, NF-5100, and NG-5100, and personnel are qualified to NB-5500, NC-5500, ND-5500, NE-5500, NF-5500, and NG-5500, respectively, in order to ensure adequate procedures and personnel remain capable of determining the structural integrity of these components. This is particularly important for small bolting, studs and nuts that only receive a visual examination. As stated in NX-4123 of Section III, only inspections performed in accordance with Article NX-4000 (e.g., marking, dimensional measurement, fitting, alignment) are exempted from NX-5100 and NX-5500, and may be qualified in accordance with the Certificate Holder's Quality Assurance Program.

10 CFR 50.55a(b)(1)(x) Section III condition: Visual examination of bolts, studs, and nuts, Second provision

The 2017 Edition requires that the final surfaces of threads, shanks, and the heads be visually examined against ASTM F788, for bolting material, and ASTM F812, for nuts, for workmanship, finish, and appearance. This examination is for acceptance of the final product to ensure its structural integrity, especially for small bolting that only receives a visual examination. However, performing an inspection for workmanship or appearance to the bolting specification is not necessarily sufficient to ensure the integrity of the bolts and nuts for their intended function in a reactor. The visual examination in Section III for bolting and nuts is intended to determine structural integrity for its intended function, which may entail quality requirements more stringent than the bolting specifications. As specified in the 2015 Edition of

Section III: “discontinuities such as laps, seams, or cracks that would be detrimental to the intended service are unacceptable.”

Therefore, the NRC proposes to add § 50.55a(b)(1)(x)(B) to condition the provisions of NB-2582, NC-2582, ND-2582, NE-2582, NF-2582, and NG-2582 in the 2017 Edition of Section III, to require use of the acceptance criteria from NB-2582, NC-2582, ND-2582, NE-2582, NF-2582, and NG-2582 in the 2015 Edition of Section III.

10 CFR 50.55a(b)(1)(xi) Section III condition: *Mandatory Appendix XXVI*

The NRC proposes to add a new paragraph with conditions on the use of ASME BPV Code, Section III, Appendix XXVI for installation of high density polyethylene (HDPE) pressure piping. This Appendix is new in the 2015 Edition of Section III, and electrofusion joining was added to this Appendix in the 2017 Edition of Section III. The 2015 Edition of Section III is the first time the ASME Code has provided rules for the use of polyethylene piping. The NRC has determined that the conditions that follow in § 50.55a(b)(1)(xi)(A) through (E) are necessary in order to utilize polyethylene piping in Class 3 safety-related applications. The conditions in § 50.55a(b)(1)(xi)(A) and (B) pertain to butt fusion joints and apply to both the 2015 and 2017 Editions of Section III. The conditions in § 50.55a(b)(1)(xi)(C) through (E) pertain to electrofusion joints and apply only to the 2017 Edition of Section III.

Both NRC and industry-funded independent research programs have shown that joint failure is the most likely cause of structural failure in HDPE piping systems. Poorly manufactured joints are susceptible to early structural failure driven by “slow crack growth,” a form of subcritical creep crack growth that is active in HDPE. The 5 provisions below are aimed at ensuring the highest quality for joints in HDPE systems and reducing the risk of poor joint fabrication. These provisions minimize the risk of joint structural failure and the resulting potential loss of system safety function.

10 CFR 50.55a(b)(1)(xi)(A) Mandatory Appendix XXVI: First provision

The NRC proposes to add a new paragraph (b)(1)(xi)(A), which specifies the essential variables to be used in qualifying fusing procedures for butt fusion joints in polyethylene piping installed in accordance with ASME Section III, Mandatory Appendix XXVI. The NRC does not endorse the use of a standardized fusing procedure specification. A fusion procedure specification will need to be generated for each butt fusion joint with the essential variables, as listed. The same variables will be listed for operator performance qualifications.

Per ASME BPV Code Section IX, QF-252, essential variables are those that will affect the mechanical properties of the fused joint, if changed, and require requalification of the Fusing Procedure Specification (FPS), Standard Fusing Procedure Specification (SFPS), or Manufacturer Qualified Electrofusion Procedure Specification (MEFPS) when any change exceeds the specified limits of the values recorded in the FPS for that variable. Fourteen essential variables for HDPE butt fusion joints for nuclear applications have been identified by NRC and industry experts through extensive research and field experience. Ten of these essential variables are the same as those identified in ASME BPV Code, Section IX, Table QF-254, which applies to all HDPE butt fusions and is not limited to nuclear applications. The other 4 variables deemed essential by the NRC are: diameter, cross-sectional area, ambient temperature, and fusing machine carriage model. These 4 additional variables are recognized by industry experts as being essential for butt fusion joints in nuclear safety applications, and have been included in a proposal to list essential variables for butt fusion in the 2019 Edition of ASME BPV Code, Section III, Mandatory Appendix XXVI.

For nuclear applications, the use of HDPE is governed by ASME BPV Code, Section III, Mandatory Appendix XXVI. The NRC has determined that to ensure butt fusion joint quality is adequate for nuclear safety applications, referencing ASME BPV Code, Section IX in ASME

BPV Code, Section III, Mandatory Appendix XXVI is not sufficient, because ASME BPV Code, Section IX is not incorporated into NRC regulations. Therefore, the NRC is including the essential variables for HDPE butt fusion as a condition on the use of ASME BPV Code Section III, Mandatory Appendix XXVI. This provision addresses the fact that the essential variables for HDPE butt fusion are not listed in the 2015 and 2017 Editions of ASME BPV Code, Section III, Mandatory Appendix XXVI. Proposals to incorporate these essential variables for butt fusion in the 2019 Edition of the Code have already been drafted and circulated within the ASME Code Committees. In the meantime, the NRC is proposing to add this provision to ensure butt fusion joint quality for nuclear safety applications.

10 CFR 50.55a(b)(1)(xi)(B) Mandatory Appendix XXVI: Second provision

The NRC proposes to add a new paragraph (b)(1)(xi)(B), which will require both bend tests and high speed tensile impact testing (HSTIT) to qualify fusing procedures for joints in polyethylene piping installed in accordance with ASME BPV Code, Section III, Mandatory Appendix XXVI. The NRC requires both bend tests and HSTIT to qualify the fusion procedures. There is data that suggests that HSTIT may not distinguish between an acceptable and unacceptable HDPE butt fusion joint and, therefore, should not be considered as a stand-alone test.

The NRC has performed limited confirmatory research on the ability of short-term mechanical tests to predict the in-service behavior of HDPE butt fusion joints. Based on this research as well as research results from The Welding Institute in the UK, the NRC lacks conclusive evidence that either of the two tests proposed in XXVI-4342(d) and XXVI-4342(e) is always a reliable predictor of joint quality. As a result, the NRC has determined that the combination of both test results provides increased and sufficient indication of butt fusion joint quality. Consequently, the NRC is proposing to add a condition that requires both tests

specified in in XXVI-4342(d) and XXVI-4342(e) to be performed as part of performance qualification tests, instead of only one or the other.

10 CFR 50.55a(b)(1)(xi)(C) Mandatory Appendix XXVI: Third provision

The NRC is proposing to add a new paragraph (b)(1)(xi)(C), which specifies the essential variables to be used in qualifying fusing procedures for electrofusion of fusion joints in polyethylene piping that is to be installed in accordance with ASME BPV Code, Section III, Mandatory Appendix XXVI. The NRC does not endorse the use of a standardized fusing procedure specification. A fusion procedure specification will need to be generated for each electrofusion joint with the essential variables as listed. The same variables will be listed for operator performance qualifications.

Per ASME BPV Code, Section IX, QF-252: “Essential variables are those that will affect the mechanical properties of the fused joint, if changed, and require requalification of the FPS, SFPS, or MEFPS when any change exceeds the specified limits of the values recorded in the FPS for that variable.” Sixteen essential variables for HDPE electrofusion for nuclear applications have been identified by NRC and industry experts through extensive research and field experience. Twelve of these essential variables are the same as those identified in ASME BPV Code, Section IX Table QF-255, which applies to all HDPE electrofusion and is not limited to nuclear applications. The other 4 variables deemed essential by the NRC are: fitting polyethylene material, pipe wall thickness, power supply, and processor. These 4 additional variables are recognized by industry experts as being essential for electrofusion joints in nuclear safety applications, and have been included in a proposal to list essential variables for electrofusion in the 2019 Edition of ASME BPV Code, Section III Mandatory Appendix XXVI.

For nuclear applications, the use of HDPE is governed by ASME BPV Code, Section III Mandatory Appendix XXVI. The NRC has determined that, to ensure electrofusion joint quality

is adequate for nuclear safety applications, referencing ASME BPV Code, Section IX in ASME BPV Code, Section III Mandatory Appendix XXVI is not sufficient, because ASME BPV Code, Section IX is not incorporated into NRC regulations. Therefore, the NRC is including the essential variables for HDPE electrofusion as a condition on the use of ASME Section III, Mandatory Appendix XXVI. This provision addresses the fact that the essential variables for HDPE electrofusion are not listed in the 2015 and 2017 Editions of ASME BPV Code, Section III, Mandatory Appendix XXVI. Proposals to incorporate these essential variables for electrofusion in the 2019 Edition of the Code have already been drafted and circulated within the ASME Code Committees. In the meantime, the NRC proposes to add this provision to ensure electrofusion joint quality for nuclear safety applications.

10 CFR 50.55a(b)(1)(xi)(D) Mandatory Appendix XXVI: Fourth provision

The NRC is proposing to add a new paragraph (b)(1)(xi)(D), which will require both crush tests and electrofusion bend tests to qualify fusing procedures for electrofusion joints in polyethylene piping installed in accordance with the 2017 Edition of ASME BPV Code, Section III, Mandatory Appendix XXVI. The NRC proposes to require both crush tests and electrofusion bend tests to qualify the electrofusion procedures. The operating experience data on electrofusion joints is extremely limited and also indicates some failures. In order to ensure structural integrity of electrofusion joints in safety related applications, the NRC is proposing to require that both crush tests and electrofusion bend tests be performed to demonstrate an acceptable HDPE electrofusion joint test.

Furthermore, a demonstration that the system or repair will not lose the ability to perform its safety function during its service life must be provided for systems that use electrofusion joints. The NRC lacks conclusive evidence regarding the ability of short-term mechanical tests to predict the in-service behavior of HDPE electrofusion joints in nuclear

safety related applications. The NRC considers that either of the 2 tests (crush test or electrofusion bend test) proposed in XXVI-2332(a) and XXVI-2332(b), separately, may not be a reliable predictor of electrofusion joint quality. As a result, the NRC has determined that the combination of both test results provides increased and sufficient indication of electrofusion joint quality. Consequently, the NRC is proposing to add a condition that requires that both tests (crush test and electrofusion bend test) specified in in XXVI-2332(a) and XXVI-2332(b) be performed as part of performance qualification tests, instead of only one or the other.

10 CFR 50.55a(b)(1)(xi)(E) Mandatory Appendix XXVI: Fifth provision

The NRC is proposing to add a new paragraph (b)(1)(xi)(E), which prohibits the use of electrofusion saddle fittings and electrofusion saddle joints. The NRC believes that the failure of electrofusion saddle joints can result in a gross structural rupture leading to loss of safety function for the system where such a joint is present. Consequently, only full 360° seamless sleeve electrofusion couplings (Electrofusion coupling, as shown in Table XXVI-3311-1 of the ASME BPV Code, Section III, 2017 Edition) and full 360° electrofusion socket joints (as shown in the top image in Figure XXVI-4110-2 of ASME BPV Code, Section III, 2017 Edition) are permitted.

Very limited information and operational experience is available for electrofusion joints in nuclear safety applications, and some Department of Energy operational experience indicates that failures have occurred in electrofusion joints. The NRC has determined that the failure of a saddle type electrofusion joint could result in structural separation of the electrofusion saddle coupling from the HDPE pipe it is attached to, resulting in a potential loss of flow and loss of safety function in the system. As a result, the NRC is proposing to add a condition that will only allow full 360° seamless sleeve type electrofusion couplings, attached with a socket type electrofusion joint. The failure of such a joint is far less likely to result in a

total loss of flow and safety function. For full 360° seamless sleeve type electrofusion couplings attached with a socket type electrofusion joint, full separation of the coupling from the pipe is highly unlikely.

10 CFR 50.55a(b)(1)(xii) Section III condition: Certifying Engineer

The NRC is proposing to add a new condition § 50.55a(b)(1)(xii) Section III Condition: *Certifying Engineer*. In the 2017 Edition of ASME BPV Code, Section III, Subsection NCA, the following Subsections were updated to replace the term "registered professional engineer," with term "certifying engineer" to be consistent with ASME BPV Code Section III Mandatory Appendix XXIII.

- NCA-3255 "Certification of the Design Specifications"
- NCA-3360 "Certification of the Construction Specification, Design Drawings, and Design Report"
- NCA-3551.1 "Design Report"
- NCA-3551.2 "Load Capacity Data Sheet"
- NCA-3551.3 "Certifying Design Report Summary" and
- NCA-3555 "Certification of Design Report"
- Table NCA-4134.17-2, "Nonpermanent Quality Assurance Records"
- NCA-5125, "Duties of Authorized Nuclear Inspector Supervisors"
- NCA-9200, "Definitions"

The NRC reviewed these changes and has determined that the use of a certifying engineer in lieu of a registered professional engineer is only applicable for non-U.S. nuclear facilities. Therefore, the term "certifying engineer" is not applicable to U.S. nuclear facilities regulated by the NRC. As a result, the NRC is proposing to add a new condition to § 50.55a

(b)(1), that would not allow applicants and licensees to use a certifying engineer in lieu of a registered professional engineer for code-related activities that are applicable to U.S. nuclear facilities regulated by the NRC.

B. ASME BPV Code, Section XI

10 CFR 50.55a(b)(2) Conditions on ASME BPV Code, Section XI

The NRC proposes to amend the regulations in § 50.55a(b)(2) to incorporate by reference the 2015 and the 2017 Editions (Division 1) of the ASME BPV Code, Section XI. The current regulations in § 50.55a(b)(2) incorporate by reference ASME BPV Code, Section XI, 1970 Edition through the 1976 Winter Addenda; and the 1977 Edition (Division 1) through the 2013 Edition (Division 1), subject to the conditions identified in current § 50.55a(b)(2)(i) through (b)(2)(xxix). The proposed amendment would revise the introductory text to § 50.55a(b)(2) to incorporate by reference the 2015 Edition (Division 1) and the 2017 Edition (Division 1) of the ASME BPV Code, Section XI, clarify the wording, and revise or provide some additional conditions, as explained in this document.

10 CFR 50.55a(b)(2)(vi) Effective edition and addenda of Subsection IWE and Subsection IWL

The NRC proposes to remove existing condition § 50.55a(b)(2)(vi). A final rule was published in the *Federal Register* (61 FR 41303) on August 8, 1996, which incorporated by reference the ASME BPV Code, Section XI, Subsection IWE and Subsection IWL for the first time. The associated statements of consideration for that rule identified the 1992 Edition with 1992 Addenda of Subsection IWE and Subsection IWL as the earliest version that the NRC found acceptable. A subsequent rule published on September 22, 1999 (64 FR 51370), included the 1995 Edition with the 1996 Addenda as an acceptable edition of the ASME BPV

Code. The statements of considerations for a later rule published on September 26, 2002 (67 FR 60520), noted that the 1992 Edition with the 1992 Addenda, or the 1995 Edition with the 1996 Addenda of Subsection IWE and IWL must be used when implementing the initial 120-month interval for the ISI of Class MC and Class CC components, and that successive 120-month interval updates must be implemented in accordance with § 50.55a(g)(4)(ii).

This requirement was in place to expedite the initial containment examinations in accordance with Subsections IWE and IWL, which were required to be completed during the 5-year period from September 6, 1996, to September 9, 2001. Now that there is an existing framework in place for containment examinations in accordance with Subsections IWE and IWL, there is no need for a condition specific to the initial examination interval. The examinations conducted during the initial interval can be conducted in accordance with § 50.55a(g)(4).

10 CFR 50.55a(b)(2)(vii): Section XI condition: Section XI references to OM Part 4, OM Part 6, and OM Part 10 (Table IWA–1600–1).

The NRC proposes to remove the condition found in § 50.55a(b)(2)(vii) of the current regulations. This paragraph describes the editions and addenda of the ASME OM Code to be used with the Section XI references to OM Part 4, OM Part 6, and OM Part 10 in Table IWA-1600–1 of Section XI. The condition is applicable to the ASME BPV Code, Section XI, Division 1, 1987 Addenda, 1988 Addenda, or 1989 Edition. Paragraph (g)(4)(ii) requires that a licensee's successive 120-month inspection intervals comply with the requirements of the latest edition and addenda of the Code incorporated by reference in § 50.55a(b)(2). Because licensees are no longer using these older editions and addenda of the Code referenced in this paragraph, this condition can be removed.

10 CFR 50.55a(b)(2)(ix) Metal Containment Examinations

The NRC proposes to revise § 50.55a(b)(2)(ix), to require compliance with new condition § 50.55a(b)(2)(ix)(K). The proposed condition will ensure containment leak-chase channel systems are properly inspected in accordance with the applicable requirements. The NRC specifies the application of this condition to all editions and addenda of Section XI, Subsection IWE, of the ASME BPV Code, prior to the 2017 Edition, that are incorporated by reference in paragraph (b) of § 50.55a.

10 CFR 50.55a(b)(2)(ix)(K) Metal Containment Examinations

The NRC proposes to add § 50.55a(b)(2)(ix)(K) to ensure containment leak-chase channel systems are properly inspected.

Regulations in § 50.55a(g), "Inservice Inspection Requirements," require that licensees implement the inservice inspection program for pressure retaining components and their integral attachments of metal containments and metallic liners of concrete containments in accordance with Subsection IWE of Section XI of the applicable edition and addenda of the ASME Code, incorporated by reference in paragraph (b) of § 50.55a and subject to the applicable conditions in paragraph (b)(2)(ix). The regulatory condition in § 50.55a(b)(2)(ix)(A) or equivalent provision in Subsection IWE of the ASME Code (2006 and later editions and addenda only) requires that licensees shall evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of, or result in, degradation to such inaccessible areas.

The containment floor weld leak-chase channel system forms a metal-to-metal interface with the containment shell or liner, the test connection end of which is at the containment floor level. Therefore, the leak-chase system provides a pathway for potential intrusion of moisture that could cause corrosion degradation of inaccessible embedded areas of the pressure-

retaining boundary of the basemat containment shell or liner within it. In addition to protecting the test connection, the cover plates and plugs and accessible components of the leak-chase system within the access box are also intended to prevent intrusion of moisture into the access box and into the inaccessible areas of the shell/liner within the leak-chase channels, thereby protecting the shell and liner from potential corrosion degradation that could affect leak-tightness.

The containment ISI program required by § 50.55a to be implemented in accordance with Subsection IWE, of the ASME Code, Section XI, subject to regulatory conditions, requires special consideration of areas susceptible to accelerated corrosion degradation and aging, and barriers intended to prevent intrusion of moisture and water accumulation against inaccessible areas of the containment pressure-retaining metallic shell or liner. The containment floor weld leak-chase channel system is one such area subject to accelerated degradation and aging if moisture intrusion and water accumulation is allowed on the embedded shell and liner within it. Therefore, the leak-chase channel system is subject to the inservice inspection requirements of § 50.55a(g)(4).

The NRC Information Notice (IN) 2014-07, "Degradation of Leak-Chase Channel Systems for Floor Welds of Metal Containment Shell and Concrete Containment Metallic Liner," (ADAMS Accession No. ML14070A114) discusses examples of licensees that did not conduct the required inservice inspections. The IN also summarizes the NRC's basis for including the leak-chase components within the scope of Subsection IWE, of the ASME Code, Section XI, and how licensees could fulfill the requirements. The NRC guidance explains that 100 percent of the accessible components of the leak-chase system should be inspected during each inspection period. There are three inspection periods in one ten-year inspection interval.

After issuance of IN 2014-07, the NRC received feedback during a public meeting

between NRC and ASME management, held on August 22, 2014 (ADAMS Accession No. ML14245A003), noting that the IN guidance appeared to be in conflict with ASME Section XI Interpretation XI-1-13-10. In response to the comment during the public meeting, the NRC issued a letter to ASME (ADAMS Accession No. ML14261A051), which stated that the NRC found the provisions in the IN to be consistent with the requirements in the ASME Code; and the NRC staff may consider adding a condition to § 50.55a to clarify the expectations. The ASME responded to the NRC's letter (ADAMS Accession No. ML15106A627) and noted that a condition in the regulations may be appropriate to clarify the NRC's position.

Based on the operating experience summarized in IN 2014-07, and the industry feedback, the NRC has determined that a new condition is necessary in § 50.55a(b)(2)(ix) to clarify the NRC's expectations and to ensure steel containment shells and liners receive appropriate examinations. In the 2017 Edition of the ASME Code, a provision was added that clearly specifies the examination of leak-chase channels. The provision requires 100 percent examination of the leak-chase channel closures over a ten-year inspection interval, as opposed to 100 percent during each inspection period. Although the examination frequency is relaxed compared to the NRC's position as identified in IN 2014-07, the NRC finds the provision in the 2017 Edition acceptable because the examination includes provisions for scope expansion and examinations of additional closures if degradation is identified within an inspection period. The NRC chose to align the condition with the acceptable provision in the latest approved edition of the ASME Code. This proposed condition would be applicable to all editions and addenda of the ASME Code prior to the 2017 Edition.

10 CFR 50.55a(b)(2)(xvii) Section XI condition: Reconciliation of quality requirements

The NRC proposes to remove the condition found in the current § 50.55a(b)(2)(xvii).

This paragraph describes requirements for reconciliation of quality requirements when purchasing replacement items. When licensees use the 1995 Addenda through 1998 Edition of ASME BPV Code, Section XI, this condition required replacement items to be purchased in accordance with the licensee's quality assurance program description required by 10 CFR 50.34(b)(6)(ii), in addition to the reconciliation provisions of IWA–4200. The NRC has accepted without conditions the content of IWA-4200 in versions of the Code since the 1999 Addenda of Section XI. Paragraph 50.55a(g)(4)(ii) requires that licensee's successive 120-month inspection intervals comply with the requirements of the latest edition and addenda of the Code incorporated by reference in § 50.55a(b)(2). Subsequently, licensees are no longer using these older editions and addenda of the Code referenced in this paragraph therefore this condition can be removed. Section 50.55a(b)(2)(xvii) would be designated as [Reserved].

*10 CFR 50.55a(b)(2)(*xviii)(D) *NDE personnel certification: Fourth provision*

The NRC proposes to amend the condition found in § 50.55a(b)(2)(xviii) to extend the applicability of the condition through the latest edition incorporated by reference in paragraph (a)(1)(ii) of this section of ASME BPV Code, Section XI. This current condition prohibits those licensees which use ASME BPV Code, Section XI, 2011 Addenda through the 2013 Edition from using Appendix VII, Table VII–4110–1 and Appendix VIII, Subarticle VIII–2200. The condition requires licensees and applicants using these versions of Section XI to use the prerequisites for ultrasonic examination personnel certifications in Appendix VII, Table VII-4110–1 and Appendix VIII, Subarticle VIII–2200 in the 2010 Edition. This condition was added when the 2010 through the 2013 Edition was incorporated by reference. When ASME published the 2015 Edition and the 2017 Editions, Appendix VII, Table VII–4110–1 and Appendix VIII, Subarticle VIII–2200 of ASME BPV Code, Section XI were not modified in a way that would make it possible for the NRC to remove this condition. Therefore, the NRC is

proposing to retain this condition to apply to the latest edition incorporated by reference in paragraph (a)(1)(ii) of § 50.55a.

10 CFR 50.55a(b)(2)(xx)(B) Section XI condition: System leakage tests: Second provision

The NRC proposes to amend the condition found in § 50.55a(b)(2)(xx)(B) to clarify the NRC's expectations related to the nondestructive examination (NDE) required when a system leakage test is performed (in lieu of a hydrostatic test) following repair and replacement activities performed by welding or brazing on a pressure retaining boundary using the 2003 Addenda through the latest edition and addenda of ASME BPV Code, Section XI incorporated by reference in paragraph (a)(1)(ii) of § 50.55a. Industry stakeholders have expressed confusion on what was required by the current regulation with regard to the Code edition/addenda that the requirements for NDE and pressure testing were required to satisfy under this condition. The NRC is proposing to modify the condition to clarify that the NDE method (e.g., surface, volumetric, etc.) and acceptance criteria of the 1992 or later of ASME BPV Code, Section III shall be met. The actual nondestructive examination and pressure testing may be performed using procedures and personnel meeting the requirements of the licensee's/applicant's current ISI code of record. This condition was first put in place by the NRC in a final rule, which became effective October 10, 2008 (73 FR 52730). The NRC determined the condition was necessary because the ASME BPV Code eliminated the requirement to perform the Section III NDE when performing a system leakage test in lieu of a hydrostatic test following repairs and replacement activities performed by welding or brazing on a pressure retaining boundary in the 2003 Addenda of ASME BPV Code, Section XI. When ASME published the 2015 Edition and the 2017 Editions, IWA-4520 was not modified in a way that would make it possible for the NRC to remove this condition. Therefore, the NRC is proposing to retain this condition to apply to the latest edition incorporated by reference in

paragraph (a)(1)(ii) of § 50.55a.

10 CFR 50.55a(b)(2)(xx)(C) Section XI condition: System leakage tests: Third provision

The NRC proposes to add § 50.55a(b)(2)(xx)(C) to provide 2 conditions for the use of the alternative Boiling Water Reactor (BWR) Class 1 system leakage test described in IWB-5210(c) and IWB-5221(d) of the 2017 Edition of ASME Section XI. The first condition addresses a prohibition against the production of heat through the use of a critical reactor core to raise the temperature of the reactor coolant and pressurize the reactor coolant pressure boundary (RCPB) (sometimes referred to as nuclear heat). The second condition addresses the duration of the hold time when testing non-insulated components to allow potential leakage to manifest itself during the performance of system leakage tests.

The alternative BWR Class 1 system leakage test was intended to address concerns that performing the ASME-required pressure test for BWRs under shutdown conditions, 1) places the unit in a position of significantly reduced margin, approaching the fracture toughness limits defined in the Technical Specification Pressure-Temperature (P–T) curves, and 2) requires abnormal plant conditions/alignments, incurring additional risks and delays, while providing little added benefit beyond tests, which could be performed at slightly reduced pressures under normal plant conditions. However, due to restrictions imposed by the pressure control systems, most BWRs cannot obtain reactor pressure corresponding to 100 percent rated power during normal startup operations at low power levels that would be conducive to performing examinations for leakage. The alternative test would be performed at slightly reduced pressures and normal plant conditions, which the NRC finds will constitute an adequate leak examination and would reduce the risk associated with abnormal plant conditions and alignments.

However, the NRC has had a longstanding prohibition against the production of heat

through the use of a critical reactor core to raise the temperature of the reactor coolant and pressurize the RCPB. A letter dated February 2, 1990, from James M. Taylor, Executive Director for Operations, NRC, to Messrs. Nicholas S. Reynolds and Daniel F. Stenger, Nuclear Utility Backfitting and Reform Group (ADAMS Accession No. ML14273A002), established the NRC's position with respect to use of a critical reactor core to raise the temperature of the reactor coolant and pressurize the RCPB. In summary, the NRC's position is that testing under these conditions involves serious impediments to careful and complete inspections and therefore creates inherent uncertainty with regard to assuring the integrity of the RCPB. Further, the practice is not consistent with basic defense-in-depth safety principles.

The NRC's position established in 1990, was reaffirmed in IN No. 98–13, ''Post-Refueling Outage Reactor Pressure Vessel Leakage Testing Before Core Criticality,'' dated April 20, 1998. The IN was issued in response to a licensee that had conducted an ASME BPV Code, Section XI, leakage test of the reactor pressure vessel (RPV) and subsequently discovered that it had violated 10 CFR part 50, appendix G, paragraph IV.A.2.d. This regulation states that pressure tests and leak tests of the reactor vessel that are required by Section XI of the ASME Code must be completed before the core is critical. The IN references NRC Inspection Report 50–254(265)-97027 (ADAMS Accession No. ML15216A276), which documents that licensee personnel performing VT–2 examinations of the drywell at one BWR plant covered 50 examination areas in 12 minutes, calling into question the adequacy of the VT–2 examinations.

The bases for the NRC's historical prohibition of pressure testing with the core critical can be summarized as follows:

1. Nuclear operation of a plant should not commence before completion of system hydrostatic and leakage testing to verify the basic integrity of the RCPB, a principal defense-in-depth barrier to the accidental release of fission products. In accordance with the defense-in-depth

safety precept, the nuclear power plant design provides for multiple barriers to the accidental release of fission products from the reactor.

2. Hydrotesting must be done essentially water solid (*i.e.,* free of pockets of air, steam or other gases) so that stored energy in the reactor coolant is minimized during a hydrotest or leaktest.

3. The elevated reactor coolant temperatures, associated with critical operation, result in a severely uncomfortable and difficult working environment in plant spaces where the system leakage inspections must be conducted. The greatly increased stored energy in the reactor coolant, when the reactor is critical, increases the hazard to personnel and equipment in the event of a leak. As a result, the ability for plant workers to perform a comprehensive and careful inspection becomes greatly diminished.

However, the NRC has determined that pressure testing with the core critical is acceptable under the following conditions: when performed after repairs of a limited scope; where only a few locations or a limited area needs to be examined; and when ASME Code Section XI, Table IWB–2500–1, Category B–P (the pressure test required once per cycle of the entire RCPB) has been recently performed verifying the integrity of the overall RCPB. The NRC also notes the alternative BWR Class 1 system leakage test does not allow for the use of the alternative test pressure following repairs/replacements on the RPV; therefore, it does not violate 10 CFR part 50, appendix G. The NRC has determined that the risk associated with nuclear heat at low power is comparable with the risk to the plant, when the test is performed without nuclear heat (with the core subcritical) during mid-cycle outages, when decay heat must be managed. Performing the pressure test under shutdown conditions at full operating pressure without nuclear heat requires securing certain key pressure control, heat removal, and safety systems. It is more difficult to control temperature and pressure when there is significant production of decay heat (e.g., after a mid-cycle outage), and may reduce the margin available to prevent exceeding the plant pressure-temperature limits.

When the pressure test is conducted using nuclear heat, the scope of repairs should be relatively small in order to minimize the personnel safety risk and to avoid rushed examinations. The alternative BWR Class 1 system leakage test does not place any restrictions on the size or scope of the repairs for which the alternative may be used, provided the alternative test pressure is not used to satisfy pressure test requirements following repair/replacement activities on the reactor vessel. It is impractical to specify a particular number of welded or mechanical repairs that would constitute a ‘‘limited scope.’’ However, if the plant is still in a refueling outage and has already performed the ASME Section XI Category B-P pressure test of the entire RCPB, it is likely that subsequent repairs would be performed only on an emergent basis, and would generally be of a limited scope. Additionally, the overall integrity of the RCPB will have been recently confirmed via the Category B–P test. For mid-cycle maintenance outages, the first condition allows the use of nuclear heat to perform the test, if the outage duration is 14 days or less. This would tend to limit the scope of repairs, and also limit the use of the code case to outages where there is a significant production of decay heat. Therefore, the first condition on the alternative BWR Class 1 system leakage test states: ‘‘The use of nuclear heat to conduct the BWR Class 1 system leakage test is prohibited (*i.e.* the reactor must be in a non-critical state), except during refueling outages in which the ASME Section XI Category B–P pressure test has already been performed, or at the end of mid-cycle maintenance outages fourteen (14) days or less in duration.’’

With respect to the second condition and adequate pressure test hold time, the technical analysis supporting the alternative BWR Class 1 system leakage test indicates that the lower test pressure provides more than 90 percent of the flow that would result from the pressure corresponding to 100 percent power. However, a reduced pressure means a lower leakage rate, so additional time is required in order for there to be sufficient leakage to be observed by inspection personnel. Section XI, paragraph IWA–5213, ‘‘Test Condition Holding

Time,'' does not require a holding time for Class 1 components, once test pressure is obtained. To account for the reduced pressure, the alternative BWR Class 1 system leakage test would require a 15-minute hold time for non-insulated components. The NRC has determined that 15 minutes does not allow for an adequate examination because it is not possible to predict the entire range of scenarios or types of defects that could result in leakage. Some types of defects could result in immediate leakage, such as an improperly torqued bolted connection; however other types of defects, such as weld defects or tight cracks, could present a more torturous path for leakage and result in delayed leakage. Due to the uncertainty in the amount of time required for leakage to occur to an extent that it would be readily detectable by visual examination, the NRC has determined that it is appropriate to conservatively specify a longer hold time of 1 hour for non-insulated components. Therefore, the second condition for the alternative BWR Class 1 system leakage test would require a one hour hold time for non-insulated components.

10 CFR 50.55a(b)(2)(xxi) Section XI condition: Table IWB–2500–1 examination requirements

The NRC proposes to remove the condition found in § 50.55a(b)(2)(xxi)(A) to allow licensees to use the current editions of ASME BPV Code, Section XI, Table IWB 2500–1, Examination Category B–D, Full Penetration Welded Nozzles in Vessels, Items B3.40 and B3.60 (Inspection Program A) and Items B3.120 and B3.140 (Inspection Program B). These inspection categories concern pressurizer and steam generator nozzle inner radius section examinations. Previously, the condition required licensees to use the 1998 Edition, which required examination of the nozzle inner radius when using the 1999 Addenda through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of § 50.55a. As these inspection requirements were removed in the ASME BPV Code in 1999, this change would effectively eliminate the requirement to examine the nozzle inner radii in steam

generators and pressurizers.

The requirements for examinations of inner nozzle radii in several components were developed in the ASME BPV Code in reaction to the discovery of thermal fatigue cracks in the inner-radius section of boiling water reactor feedwater nozzles in the late 1970's and early 1980's. As described in NUREG/CR-7153, "Expanded Materials Degradation Assessment (EMDA), " (ADAMS Accession Nos. ML14279A321, ML14279A461, ML14279A349, ML14279A430, and ML14279A331), and NUREG-0619-Rev-1, "BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking: Resolution of Generic Technical Activity A-10 (Technical Report)," (ADAMS Accession No. ML031600712), the service-induced flaws that have been observed are cracks at feedwater nozzles associated with mixing of lower-temperature water with hot water in a BWR vessel with rare instances of underclad and shallow cladding cracking appearing in pressurized water reactor (PWR) nozzles. Feedwater nozzle inner radius cracking has not been detected since the plants changed operation of the low flow feedwater controller. Significant inspections and repairs were required in the late 1970s and early 1980s to address these problems. The redesign of safe end/thermal sleeve configurations and feedwater spargers, coupled with changes in operating procedures, has been effective to date. No further occurrences of nozzle fatigue cracking have been reported for PWRs or BWRs.

When the new designs and operating procedures appeared to have mitigated the nozzle inner radius cracking, the ASME BPV Code, Section XI requirements to inspect steam generator and pressurizer nozzle inner radii were removed in the 1999 Addenda of ASME BPV Code, Section XI. Since the NRC imposed the condition requiring that these areas be inspected in 2002, no new cracking has been identified in steam generator or pressurizer nozzle inner radii. The NRC finds that the complete absence of cracking since the operational change provides reasonable assurance that the observed cracking was the result of

operational practices that have been discontinued. Because the inner radius inspections were instituted solely based on the observed cracking and since the cracking mechanism has now been resolved through changes in operation, the NRC finds that the intended purpose of the steam generator and pressurizer inner radius exams no longer exists and that the exams can be discontinued.

In addition to operating experience, the NRC has reviewed the nozzle inner radii examinations as part of approving alternatives and granting relief requests concerning inspections of the pressurizer and steam generator nozzle inner radii. In the safety evaluations for proposed alternatives, the NRC has concluded that the fatigue analysis for a variety of plants shows that there is reasonable assurance that there will not be significant cracking at the steam generator or pressurizer nozzle inner radii before the end of the operating licenses of the nuclear power plants.

Therefore, based on the design changes, operating experiences, and analysis done by industry and the NRC, the NRC proposes to remove § 55.55a (b)(2)(xxi)(A), which requires the inspection of pressurizer and steam generator nozzle inner radii.

10 CFR 50.55a(b)(2)(xxi)(B) Section XI Condition: Table IWB-2500-1 examination requirements

The NRC is proposing to add a new paragraph (b)(2)(xxi)(B) that will place conditions on the use of the provisions of IWB-2500(f) and (g) and Notes 6 and 7 of Table IWB-2500-1 of the 2017 Edition of ASME BPV Code, Section XI. These provisions would allow licensees of BWRs to reduce the number of Item Number B3.90 and B3.100 components to be examined from 100 percent to 25 percent. These conditions would require licensees using the provisions of IWB-2500(f) to maintain the evaluations that determined the plant satisfied the criteria of IWB-2500(f) as records in accordance with IWA-1400. The conditions would prohibit use of a

new provision in Section XI, 2017 Edition, Table 2500-1 Category B-D, Full Penetration Welded Nozzles in Vessels, Items B3.90 and B3.100, specific to BWR nuclear power plants with renewed operating licenses or renewed combined licensees in accordance with 10 CFR part 54. The final condition would not allow the use of these provisions to eliminate preservice or inservice volumetric examinations of plants with a Combined Operating License pursuant to 10 CFR part 52, or a plant that receives its operating license after October 22, 2015.

The addition of these provisions addresses the incorporation of Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds Section XI, Division 1 into the Code. The proposed conditions are consistent with those proposed for Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 19.

The NRC finds that eliminating the volumetric preservice or inservice examination, as would be allowed by implementing the provisions of IWB-2500(g) and Note 7 of Table IWB-2500-1, should be predicated on good operating experience for the existing fleet, which has not found any inner radius cracking in the nozzles within scope of the code case. New reactor designs do not have any operating experience; therefore, the proposed condition will ensure that new reactors would perform volumetric examinations of nozzle inner radii to gather operating experience.

10 CFR 50.55a(b)(2)(xxv) Section XI condition: Mitigation of defects by modification

The NRC proposes to amend the condition found in § 50.55a(b)(2)(xxv) to allow the use of IWA-4340 of ASME BPV Code, Section XI, 2011 Addenda through 2017 Edition with conditions. The modification of § 50.55a(b)(2)(xxv) would add paragraph (A) and would continue the prohibition of IWA-4340 for Section XI editions and addenda prior to the 2011 Addenda. It would also add paragraph (B), which would contain the three conditions that the

NRC is proposing to place on the use of IWA-4340 of Section XI, 2011 Addenda through 2017 Edition.

10 CFR 50.55a(b)(2)(xxv)(A) Mitigation of defects by modification: First provision

The NRC proposes to add paragraph (b)(2)(xxv)(A), which would continue the prohibition of IWA-4340 for Section XI editions and addenda prior to the 2011 Addenda. IWA-4340 as originally incorporated into Section XI, Subsubarticle IWA-4340 did not include critical requirements that were incorporated into later editions of Section XI such as: (a) characterization of the cause and projected growth of the defect; (b) verification that the flaw is not propagating into material credited for structural integrity; (c) prohibition of repeated modifications where a defect area grew into the material required for the modification; and (d) pressure testing. Therefore, the NRC prohibited the use of IWA-4340 in its original form. This new paragraph would be necessary to maintain the prohibition because the NRC, as described in the following paragraph, is proposing to allow the use of IWA-4340 of Section XI, 2011 Addenda through 2017 Edition.

10 CFR 50.55a(b)(2)(xxv)(B) Mitigation of defects by modification: *Second provision*

The NRC proposes to add paragraph (b)(2)(xxv)(B) to allow the use of IWA-4340 of Section XI, 2011 Addenda through 2017 Edition with three conditions. The NRC finds that IWA-4340 as incorporated into later editions of Section XI was improved with requirements such as: (a) characterization of the cause and projected growth of the defect; (b) verification that the flaw is not propagating into material credited for structural integrity; (c) prohibition of repeated modifications where a defect area grew into the material required for the modification; and (d) pressure testing. With inclusion of these requirements and those stated in the following conditions, the NRC concludes that there are appropriate requirements in place to provide

reasonable assurance that the modification will provide an adequate pressure boundary, even while considering potential growth of the defect. The conditions and the basis for each are as follows:

- The first proposed condition would prohibit the use of IWA-4340 on crack-like defects or those associated with flow accelerated corrosion. The design requirements and potentially the periodicity of follow-up inspections might not be adequate for crack-like defects that could propagate much faster than defects due to loss of material. Therefore, the NRC proposes to prohibit the use of IWA-4340 on crack-like defects. Loss of material due to flow accelerated corrosion is managed by licensee programs based on industry standards. The periodicity of follow-up inspections is best managed by plant-specific flow accelerated corrosion programs. In addition, subparagraph IWA-4421(c)(2) provides provisions for restoring minimum required wall thickness by welding or brazing, including loss of material due to flow accelerated corrosion.
- The second proposed condition would require the design of a modification that mitigates a defect to incorporate a loss of material rate either 2 times the actual measured corrosion rate in the location, or 4 times the estimated maximum corrosion rate for the piping system. Corrosion rates are influenced by local conditions (e.g., flow rate, discontinuities). The condition to extrapolate a loss of material rate either 2 times the actual measured corrosion rate in the location, or 4 times the estimated maximum corrosion rate for the system is consistent with ASME Code Cases N-786-1, "Alternative Requirements for Sleeve Reinforcement of Class 2 and 3 Moderate Energy Carbon Steel Piping," and N-789, "Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate Energy Carbon Steel Piping for Raw Water Service." The NRC concludes that these multipliers are appropriate if the wall thickness measurements in

the vicinity of the defect were only obtained once. In contrast, if wall thickness measurements were obtained in two or more refueling outage cycles, the NRC concludes that there is a sufficient span of time to be able to trend the corrosion rate into the future. This conclusion is based in part on the follow-up wall thickness measurements that are conducted subsequent to installation of the modification.

- The third proposed condition would require the Owner to perform a wall thickness examination in the vicinity of the modification and relevant pipe base metal during each refueling outage cycle to detect propagation of the flaw into the material credited for structural integrity of the item, unless the examinations in the two refueling outage cycles subsequent to the installation of the modification are capable of validating the projected flaw growth. The NRC concludes that the provision allowed by subparagraph IWA-4340(g) to conduct follow-up wall thickness measurements only to the extent that they demonstrate that the defect has not propagated into the material credited for structural integrity is not sufficient because it does not provide a verification of the projected flaw growth. Subparagraph IWA-4340(h) does not fully address the NRC's concern because it allows for projected flaw growth to be based on "prior Owner or industry experiences with the same conditions" instead of specific measurements in the location of the modification. The proposed condition allows for only conducting examinations in the two refueling outages subsequent to the installation of the modification, consistent with subparagraph IWA-4340(g), if the measurements are capable of projecting the flaw growth.

10 CFR 50.55a(b)(2)(xxvi) Section XI condition: Pressure testing Class 1, 2 and 3 mechanical joints

The NRC proposes to amend the condition found in § 50.55a(b)(2)(xxvi) to clarify the

NRC's expectations related to the pressure testing of ASME BPV Code Class 1, 2, and 3 mechanical joints disassembled and reassembled during the performance of an ASME BPV Code, Section XI activity. Industry stakeholders have expressed confusion with the current regulatory requirements with regard to when a pressure test was required and which year of the Code the pressure testing should be in compliance with in accordance with this condition. The NRC proposes to modify the condition to clarify that all mechanical joints in Class 1, 2 and 3 piping and components greater than NPS-1 that are disassembled and reassembled during the performance of a Section XI activity (e.g., a repair/replacement activity) shall be pressure tested in accordance with IWA-5211(a). The pressure testing shall be performed using procedures and personnel meeting the requirements of the licensee's/applicant's current code of record. This condition was first put in place by the NRC in the final rule effective November 1, 2004 (69 FR 58804). The NRC determined that the condition was necessary because the ASME BPV Code eliminated the requirements to pressure test Class 1, 2, and 3 mechanical joints undergoing repair and replacement activities in the 1999 Addenda. The NRC finds that pressure testing of mechanical joints affected by repair and replacement activities is necessary to ensure and verify the leak tight integrity of the system pressure boundary.

10 CFR 50.55a(b)(2)(xxxii) Section XI condition: Summary report submittal

The NRC proposes to amend the condition found in § 50.55a(b)(2)(xxxii) to address the use of Owner Activity Reports. Through the 2013 Edition of ASME BPV Code, Section XI, Owners were required to prepare Summary Reports of preservice and inservice examinations and repair replacement activities. This condition was added when the 2013 Edition was incorporated by reference because up until that time, Owners were required to submit these reports to the regulatory authority having jurisdiction of the plant site. The 2013 Edition removed the requirement for submittal from IWA-6240(c), to state that submittal was only

mandatory if required by the authority. The NRC added the condition in paragraph (b)(2)(xxxii) to require submittal of Summary Reports. In the 2015 Edition of ASME BPV Code, Section XI the title of these reports was changed from Summary Reports to Owner Activity Reports. Therefore, the NRC is proposing to amend the condition to also require the submittal of Owner Activity Reports.

10 CFR 50.55a (b)(2)(xxxiv) Section XI condition: Nonmandatory Appendix U

The NRC proposes to amend the requirements in current paragraph (b)(2)(xxxiv) to make the condition applicable to the latest edition incorporated by reference in paragraph (a)(1)(ii) of § 50.55a. The current condition in paragraph (b)(2)(xxxiv)(A) requires repair and replacement activities temporarily deferred under the provisions of Nonmandatory Appendix U to be performed during the next scheduled refueling outage. This condition was added when the 2013 Edition was incorporated by reference. When ASME published the 2015 Edition and the 2017 Editions, Nonmandatory Appendix U was not modified in a way that would make it possible for the NRC to remove this condition. Therefore, the NRC is proposing to retain this condition to apply to the latest edition incorporated by reference in paragraph (a)(1)(ii) of § 50.55a. The current condition in paragraph (b)(2)(xxxiv)(B) requires a mandatory appendix in ASME Code Case N-513-3 to be used as the referenced appendix for paragraph U-S1-4.2.1(c). This condition was also added when the 2013 Edition was incorporated by reference. The omission that made this condition necessary was remedied in the 2017 Edition. Therefore, the NRC is proposing to retain this condition to apply to only to the 2013 and the 2015 Editions.

10 CFR 50.55a(b)(2)(xxxv) Section XI condition: Use of RT_{T0} in the K_{Ia} and K_{Ic} equations

The NRC proposes to re-designate the requirements in current paragraph (b)(2)(xxxv), that address the use of the 2013 Edition of ASME BPV Code, Section XI, Appendix A,

paragraph A–4200, as (b)(2)(xxxv)(A). The ASME BPV Code has addressed the NRC concern related to this condition in the 2015 Edition; however, it is still relevant to licensees/applicants using the 2013 Edition. The NRC proposes to add a new paragraph (b)(2)(xxv)(B) to condition the use of 2015 Edition of ASME BPV Code, Section XI, Appendix A, paragraph A-4200(c), to require the use of the equation RT_{KIa} = T0 + 90.267 exp(-0.003406T0) in lieu of the equation (a), shown in the Code. Paragraph A-4200(c) was added in the 2015 Edition to provide for an alternative method in establishing a fracture-toughness-based reference temperature, RT_{T0}, for pressure retaining materials, using fracture toughness test data. Equation (b) was derived from test data using the International System of Units (SI units). Equation (a) was a converted version of equation (b) using U.S Customary units. Unfortunately, an error was made in the conversion, which makes equation (a) incorrect. The equation shown in this paragraph for RT_{KIa} is the correct formula.

10 CFR 50.55a(b)(2)(xxxvi) Section XI condition: Fracture toughness of irradiated materials

The NRC proposes to amend the condition found in § 50.55a(b)(2)(xxxvi) to extend the applicability to use of the 2015 and 2017 Editions of ASME BPV Code, Section XI. This current condition requires licensees using ASME BPV Code, Section XI, 2013 Edition, Appendix A, paragraph A-4400, to obtain NRC approval before using irradiated T_0 and the associated RT_{T0} in establishing fracture toughness of irradiated materials. This condition was added when the 2013 Edition was incorporated by reference because the newly introduced A-4200(b) could mislead the users of Appendix A into adopting methodology that is not accepted by the NRC. When ASME published the 2015 Edition and the 2017 Editions, Appendix A of the ASME BPV Code, Section XI was not modified in a way that would make it possible for the NRC to remove this condition. Therefore, the NRC is proposing to retain this condition to apply to the 2015 and 2017 Editions.

10 CFR 50.55a(b)(2)(xxxviii) Section XI condition: ASME Code Section XI Appendix III Supplement 2

The NRC proposes to add § 50.55a(b)(2)(xxxviii) to condition ASME BPV Code, Section XI Appendix III Supplement 2. Supplement 2 is closely-based on ASME Code Case N-824, which was incorporated by reference with conditions in § 50.55a(b)(2)(xxxvii). The conditions on ASME BPV Code, Section XI Appendix III Supplement 2 are consistent with the conditions on ASME Code Case N-824, published in July 18, 2017 (82 FR 32934).

The conditions are derived from research into methods for inspecting Cast Austenitic Stainless Steel (CASS) components; these methods are published in NUREG/CR-6933, "Assessment of Crack Detection in Heavy-Walled Cast Stainless Steel Piping Welds Using Advanced Low-Frequency Ultrasonic Methods," (ADAMS Accession Nos. ML071020410 and ML071020414), and NUREG/CR-7122, "An Evaluation of Ultrasonic Phased Array Testing for Cast Austenitic Stainless Steel Pressurizer Surge Line Piping Welds," (ADAMS Accession No. ML12087A004). These NUREG/CR reports show that CASS materials less than 1.6 inches thick can be reliably inspected for flaws 10 percent through-wall or deeper if encoded phased-array examinations are performed using low ultrasonic frequencies and a sufficient number of inspection angles. Additionally, for thicker welds, flaws greater than 30 percent through-wall in depth can be detected using low frequency encoded phased-array ultrasonic inspections.

The NRC, using NUREG/CR-6933 and NUREG/CR-7122, has determined that sufficient technical basis exists to condition ASME BPV Code, Section XI, Appendix III Supplement 2. The NUREG/CR reports show that CASS materials produce high levels of coherent noise and that the noise signals can be confusing and mask flaw indications. The optimum inspection frequencies for examining CASS components of various thicknesses as described in NUREG/CR-6933 and NUREG/CR-7122 are reflected in proposed condition

§ 50.55a(b)(2)(*xxxviii*)(A). As NUREG/CR-6933 shows that the grain structure of CASS can reduce the effectiveness of some inspection angles, the NRC finds sufficient technical basis for the use of ultrasound using angles including, but not limited to, 30 to 55 degrees, with a maximum increment of 5 degrees. This is reflected in proposed condition § 50.55a(b)(2)(*xxxviii*)(B).

10 CFR 50.55a(b)(2)(xxxix)(A) Defect Removal: First provision

The NRC proposes to add § 50.55a(b)(2)(xxxix)(A) to place conditions on the use of ASME BPV Code, Section XI, IWA-4421(c)(1). The condition establishes that the final configuration of the item will be in accordance with the original Construction Code, later editions and addenda of the Construction Code, or a later different Construction Code, as well as meeting the Owner's Requirements or revised Owner's Requirements. This condition would ensure that welding, brazing, fabrication, and installation requirements, as well as design requirements for material, design or configuration changes, are consistent with the Construction Code and Owner's Requirements. This condition retains the intent of the revision to Section XI that: (a) replacements in kind are acceptable; (b) replacements with alternative configurations are acceptable as long as Construction Code and Owner's Requirements are met; and (c) defect removal is required; however, this can be accomplished by replacing all or a portion of the item containing the defect.

10 CFR 50.55a(b)(2)(xxxix)(B) Defect Removal: Second provision

The NRC proposes to add § 50.55a(b)(2)(xxxix)(B) to place conditions on the use of ASME BPV Code, Section XI, IWA-4421(c)(2). The inclusion of subparagraph IWA-4421(c)(2) is intended to address wall thickness degradation where the missing wall thickness is restored by weld metal deposition. This repair activity restores the wall thickness to an acceptable

condition; however, it does not "remove" the degraded wall thickness (i.e., the defect); rather, restoration of wall thickness by welding or brazing mitigates the need to remove the defect. However, increasing the wall thickness of an item to reclassify a crack from a defect to a flaw[3] is not acceptable because there are no provisions in subparagraph IWA-4421(c)(2) for analyses and ongoing monitoring of potential crack growth. Therefore, this proposed condition would prohibit the use of subparagraph IWA-4421(c)(2) rather than replacement for crack-like defects.

10 CFR 50.55a(b)(2)(xl) Section XI Condition: Prohibitions on use of IWB-3510.4(b)

The NRC proposes to add § 50.55a(b)(2)(xl) to prohibit the use of ASME BPV Code, Section XI, Subparagraphs IWB-3510.4(b)(4) and IWB-3510.4(b)(5), which allow use of certain acceptance standard tables for high yield strength ferritic materials because they are not supported by the fracture toughness data.

The ASME BPV Code, Section XI, Subarticle IWB-3500 provides acceptance standards for pressure retaining components made of ferritic steels. Subparagraph IWB-3510.4 specifies material requirements for ferritic steels for application of the acceptance standards. In prior editions of the ASME BPV Code, Section XI, the material requirements for ferritic steels for which the acceptance standards of IWB-3500 apply are included in a note under the title of tables that specify allowable flaw sizes (e.g., Table IWB-3510-1 "Allowable Planar Flaws"). Subparagraph IWB-3510.4 separates ferritic materials into three groups: (a) those with a minimum yield strength of 50 ksi or less, (b) five ferritic steels with these material designations: SA-508 Grade 2 Class 2 (former designation: SA-508 Class 2a), SA-508 Grade 3 Class 2

3 As defined in ASME BPV Code, Section XI, Article IWA-9000, a "flaw" is as an imperfection or unintentional discontinuity that is detectable by nondestructive examination and a "defect" is defined as a flaw of such size, shape, orientation, location, or properties as to be rejectable.

(former designation: SA-508 Class 3a), SA-533 Type A Class 2 (former designation: SA-533 Grade A Class 2), SA-533 Type B Class 2 (former designation: SA-533 Grade B Class 2), and SA-508 Class 1, and (c) those with greater than 50 ksi but not exceeding 90 ksi. The material requirements for ferritic steels with a minimum yield strength of 50 ksi or less and those with greater than 50 ksi but not exceeding 90 ksi are explicitly specified. However, there are no material requirements for the five ferritic steels identified above.

The NRC finds Subparagraph IWB-3510.4(a) acceptable because it is consistent with the current material requirements for ferritic steels having a minimum yield strength of 50 ksi or less. The NRC finds Subparagraph IWB-3510.4(c) acceptable because it is consistent with the current material requirements for ferritic steels having a minimum yield strength of greater than 50 ksi to 90 ksi.

The NRC does not find Subparagraphs IWB-3510.4(b)(4) and (5) acceptable for the following reasons. The NRC plotted the ASME BPV Code, Section XI static plain-strain fracture toughness (K_{IC}) curve in relevant figures in an ASME conference paper, PVP2010-25214, “Fracture Toughness of Pressure Boundary Steels with Higher Yield Strength” that shows dynamic fracture toughness (K_{ID}) data for materials listed in IWB-3510.4 (b)(1) to IWB-3510.4 (b)(4). The NRC confirmed that the materials listed in IWB-3510.4 (b)(1) and IWB-3510.4 (b)(3) are acceptable because the data are above the K_{IC} curve with adequate margin to compensate for the limited data size. Additionally, the NRC has approved the use of the materials listed in IWB-3510.4 (b)(1) and IWB-3510.4 (b)(3) in a licensing and a design certification application. For the material listed in IWB-3510.4 (b)(2), K_{ID} data was demonstrated to be above the crack arrest fracture toughness (K_{Ia}). The NRC has previously determined the K_{Ia} fracture toughness standard to be acceptable. Hence, the materials listed in IWB-3510.4 (b)(2) are acceptable. However, the technical basis document does not provide sufficient data to support exclusion of the fracture toughness requirements for the materials

specified in Subparagraphs IWB-3510.4(b)(4) and IWB-3510.4(b)(5).

This proposed condition does not change the current material requirements because licensees/applicants may continue to use testing to show that the two prohibited materials meet the material requirements.

10 CFR 50.55a(b)(2)(xli) Section XI Condition: Preservice Volumetric and Surface Examinations Acceptance

The NRC proposes to add § 50.55a(b)(2)(xli) to prohibit the use of ASME BPV Code, Section XI, Subparagraphs IWB-3112(a)(3) and IWC-3112(a)(3) in the 2013 through 2017 Edition. The NRC is prohibiting these items consistent with a final rule that approved ASME BPV Code Cases for use, dated January 17, 2018, (83 FR 2331).

During the review of public comments that were submitted on the proposed rule, dated March 2, 2016, (81 FR 10780), the NRC identified inconsistencies between Regulatory Guide 1.193, "ASME Code Cases Not Approved for Use,'' Revision 5, and a then concurrent proposed rule to incorporate by reference the 2009-2013 Editions of the ASME BPV Code (80 FR 56819), dated December 2, 2015.

Specifically, conditions that pertain to the staff's disapproval of Code Case N-813, "Alternative Requirements for Preservice Volumetric and Surface Examination," in the ASME BPV Code Regulatory Guide 1.193 proposed rule were not included in the ASME BPV 2009-2013 Editions proposed rule; however, the content of Code Case N-813 had been incorporated in the 2013 Edition of the ASME Code, Section XI. In order to resolve this conflict, the NRC excluded from the incorporation by reference those applicable portions of Section IX in the 2011a Addenda and the 2013 Edition, in § 50.55a(a)(1)(ii)(C)(52) and (53) respectively. This allowed the NRC to develop an appropriate regulatory approach for the treatment of these provisions that is consistent with the ASME BPV Code Regulatory Guide 1.193 rulemaking, in

which the NRC found the acceptance of preservice flaws by analytical evaluation unacceptable.

Code Case N-813 is a proposed alternative to the provisions of the 2010 Edition of the ASME Code, Section XI, paragraph IWB-3112. Paragraph IWB-3112 does not allow the acceptance of flaws detected in the preservice examination by analytical evaluation. Code Case N-813 would allow the acceptance of these flaws through analytical evaluation. Per paragraph IWB-3112, any preservice flaw that exceeds the acceptance standards of Table IWB-3410-1 must be removed. While it is recognized that operating experience has shown that large through-wall flaws and leakages have developed in previously repaired welds as a result of weld residual stresses, the NRC has the following concerns regarding the proposed alternative in Code Case N-813:

(1) The requirements of paragraph IWB-3112 were developed to ensure that defective welds were not placed in service. The NRC finds that a preservice flaw detected in a weld that exceeds the acceptance standards of Table IWB-3410-1 demonstrates poor workmanship and/or inadequate welding practice and procedures. The NRC finds that such an unacceptable preservice flaw needs to be removed and the weld needs to be repaired before it is placed in service.

(2) Under Code Case N-813, large flaws would be allowed to remain in service because paragraph IWB-3132.3, via paragraph IWB-3643, allows a flaw up to 75 percent through-wall to remain in service. The NRC finds that larger flaws could grow to an unacceptable size between inspections, reducing structural margin and potentially challenging the structural integrity of safety-related Class 1 and Class 2 piping.

Paragraph C-3112(a)(3) of Code Case N-813, provides the same alternatives for Class 2 piping as that of Paragraph B-3122(a)(3). The NRC has the same concerns for Class 2 piping as for Class 1 piping.

Therefore, for the acceptance of preservice flaws by analytical evaluation, the NRC proposes to add a condition that prohibits the use of IWB-3112(a)(3) and IWC-3112(a)(3) in the 2013 Edition of ASME BPV Code Section XI through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of § 50.55a.

10 CFR 50.55a(b)(2)(xlii) Section XI Condition: Steam Generator Nozzle-to-Component welds and Reactor Vessel Nozzle-to-Component welds

The NRC proposes to add § 50.55a(b)(2)(xlii) to require that the examination of Steam Generator Nozzle-to-Component welds and Reactor Vessel Nozzle-to-Component welds must be a full volume examination and that the ultrasonic examination procedures, equipment, and personnel must be qualified by performance demonstration in accordance with Mandatory Appendix VIII of ASME Code, Section XI. These proposed conditions are consistent with the conditions on ASME Code Case N-799 in Regulatory Guide 1.147, Revision 18, which was incorporated by reference in § 50.55a in the final rule that approved ASME BPV Code Cases for use, dated January 17, 2018 (83 FR 2331). The NRC is adding this condition in order to be consistent with that final rule.

During the review of the public comments that were submitted on the proposed rule, dated March 2, 2016, (81 FR 10780), the NRC identified inconsistencies between Regulatory Guide 1.147, and a then concurrent proposed rule to incorporate by reference the 2009-2013 Editions of the ASME BPV Code (80 FR 56819), dated December 2, 2015.

Specifically, conditions that pertain to Code Case N-799, “Dissimilar Metal Welds Joining Vessel Nozzles to Components,” in the ASME BPV Code Regulatory Guide 1.147 proposed rule were not included in the ASME BPV 2009-2013 Editions proposed rule. However, the content of Code Case N-799 had been incorporated in the 2013 Edition of the ASME Code, Section XI. In order to resolve this conflict, the NRC excluded from the

incorporation by reference those applicable portions of Section IX in the 2011a Addenda and the 2013 Edition, in § 50.55a(a)(1)(ii)(C)(52) and (53), respectively. This allowed the NRC to develop an appropriate regulatory approach for the treatment of these provisions that is consistent with the ASME BPV Code Regulatory Guide 1.147 final rule, in which the NRC required that the examination of the aforementioned welds must be full volume and that the ultrasonic examination procedures, equipment, and personnel must be qualified by performance demonstration in accordance with Mandatory Appendix VIII of ASME Code, Section XI.

Of particular interest to the NRC is the condition requiring the examination of dissimilar metal welds between vessel nozzles and components to be full volume and the condition for requiring performance demonstration in accordance with Mandatory Appendix VIII of ASME Code, Section XI. The following focuses on the AP1000 design, although a similar issue exists for the reactor vessel-to-reactor coolant pump connection for the Advanced Boiling Water Reactor (ABWR) design.

The AP1000 design is unique in that a reactor coolant pump is welded directly to each of the two outlet nozzles on the steam generator channel head. This steam generator nozzle to reactor coolant pump casing (SG-to-RCP) weld is a dissimilar metal (low alloy steel to cast austenitic stainless steel with Alloy 52/152 weld metal) circumferential butt weld with a double sided weld joint configuration similar to that of a reactor vessel shell weld. Also, this unique component-to-component weld is part of the reactor coolant pressure boundary and therefore subject to the examination requirements of ASME Section XI, Subsection IWB. However, prior to the development of Code Case N-799 (since incorporated into ASME Section XI, IWB-2500, as part of the 2011 Addenda), the examination requirements for the SG-to-RCP welds were not addressed in the ASME Code.

The NRC's first concern is that the examinations required by Code Case N-799 do not

provide assurance that the integrity of the SG-to-RCP welds will be maintained throughout the operating life of the AP1000 plant. Traditionally, ASME Section XI, IWB-2500 requires a full volume examination of all component welds, except those welds found in piping and those found in nozzles welded to piping. However, Code Case N-799 only requires a licensee to perform a volumetric examination of the inner 1/3 of the weld and a surface examination of the outer diameter. The NRC finds that the requirements of Code Case N-799 are identical to those in ASME Section XI, Table IWB-2500-1, Examination Category B-F for welds between vessels nozzles larger than NPS 4 and piping. As such, the NRC finds that the examination requirements proposed in Code Case N-799 are not appropriate for the SG-to-RCP weld because the service conditions of this weld are significantly different from those that would be experienced by a traditional vessel nozzle-to-piping/safe end butt weld.

Specifically, in addition to the operating environment (RCS pressure, temperature, and exposure to coolant) and loads expected on a traditional nozzle-to-safe end weld, each SG-to-RCP weld will support the full weight of a reactor coolant pump with no other vertical or lateral supports. The SG-to-RCP welds will also be subject to pump rotational forces and vibration loads from both the steam generator and the reactor coolant pump. In the absence of operating experience for the weld in question or a bounding analysis, which demonstrates that a potential fabrication defect in the outer 2/3 of the weld will not experience subcritical crack growth, the NRC finds that the effects of these additional operating loads and stresses are unknown. Absent operating experience or a bounding analysis, the NRC finds that it is inappropriate to allow a reduced examination volume at this time. Therefore, the NRC is proposing that the examination of the aforementioned welds must be full volume.

The NRC's second concern is that the examinations required by Code Case N-799 do not provide assurance that inservice degradation can be detected for this dissimilar metal weld that includes CASS. Code Case N-799 does not require the use of performance demonstration

in accordance with Mandatory Appendix VIII of the ASME Code, Section XI. The NRC finds that ultrasonic inspection of CASS material is difficult due to the grain structure of the material. In order to have a meaningful ultrasonic examination to detect and size inservice degradation, the ultrasonic examination procedures, equipment, and personnel must be qualified by performance demonstration in accordance with Mandatory Appendix VIII of ASME Code, Section XI. This is consistent with current practices for other ultrasonic examinations of dissimilar metal welds in the operating fleet.

When considering these proposed conditions, the NRC recognizes that factors exist that may limit the ultrasonic examination volume that can be qualified by performance demonstration. For example, the qualified volume would be limited in components with wall thicknesses beyond the crack detection and sizing capabilities of a through wall ultrasonic performance-based qualification. To address the scenario in which the examination volume that can be qualified by performance demonstration is less than 100 percent of the volume, the NRC is proposing to allow an ultrasonic examination of the qualified volume, provided that a flaw evaluation is performed to demonstrate the integrity of the examination volume that cannot be qualified by performance demonstration. The flaw evaluation should be of the largest hypothetical crack that could exist in the volume not qualified for ultrasonic examination. The licensee's revised examination plan would be subject to prior NRC approval as an alternative in accordance with § 50.55a(z). The NRC believes that this proposed condition provides assurance that the integrity of the welds in question will be maintained, despite a limited examination capability.

Finally, these proposed conditions are consistent with the conditions described in Regulatory Guide 1.147, Revision 18, which conditionally accepts Code Case N-799. Because Code Case N-799 has been incorporated into ASME Section XI, the NRC's conditions on the Code Case will be carried over as a condition on the ASME Code.

Therefore, in order to ensure that the examinations of Steam Generator Nozzle-to-Component welds and Reactor Vessel Nozzle-to-Component welds will be examinations of the full volume of the welds and that the ultrasonic examination procedures, equipment, and personnel are qualified by performance demonstration, in accordance with Mandatory Appendix VIII of ASME Code, Section XI, the NRC proposes to add conditions to the provisions of Table IWB-2500-1, Examination Category B-F, Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles, Item B5.11 (NPS 4 or Larger Nozzle-to-Component Butt Welds) of the 2013 Edition through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of § 50.55a. The NRC also proposes to add a condition to the provision of Table IWB-2500-1, Item B5.71 (NPS 4 or Larger Nozzle-to-Component Butt Welds) of the 2011 Addenda through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of § 50.55a.

C. ASME OM Code

10 CFR 50.55a(b)(3), Conditions on ASME OM Code

The new Appendix IV in the 2017 Edition of the ASME OM Code provides improved preservice testing (PST) and IST of active air operated valves (AOVs) within the scope of the ASME OM Code. Appendix IV specifies quarterly stroke-time testing of AOVs, where practicable. These are similar to the current requirements in Subsection ISTC, “Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants,” of the ASME OM Code. In addition, Appendix IV specifies a preservice performance assessment test for AOVs with low safety significance, and initial and periodic performance assessment testing for AOVs with high safety significance on a sampling basis over a maximum 10-year interval.

The ASME developed the improved PST and IST provisions for AOVs in Appendix IV to the ASME OM Code in response to lessons learned from operating experience and test programs for AOVs and other power-operated valves (POVs) used at nuclear power plants.

Over the years, the NRC has issued numerous generic communications to address weaknesses with AOVs and other POVs in performing their safety functions. For example, the NRC issued Generic Letter (GL) 88-14, “Instrument Air Supply System Problems Affecting Safety-Related Equipment,” to request that licensees verify that AOVs will perform as expected in accordance with all design-basis events. The NRC provided the results of studies of POV issues in several documents, including NUREG/CR-6654, “A Study of Air-Operated Valves in U.S. Nuclear Power Plants” (ADAMS Accession No. ML003691872). The NRC has issued several information notices to alert licensees to IST experience related to POV performance, including IN 86-50, “Inadequate Testing To Detect Failures of Safety-Related Pneumatic Components or Systems;” and IN 85-84, “Inadequate Inservice Testing of Main Steam Isolation Valves.” The NRC issued IN 96-48, “Motor-Operated Valve Performance Issues,” which described lessons learned from motor-operated valve (MOV) programs that are applicable to other POVs. Based on operating experience with the capability of POVs to perform their safety functions, the NRC established Generic Safety Issue 158, “Performance of Safety-Related Power-Operated Valves Under Design-Basis Conditions,” to evaluate whether additional regulatory actions were necessary to address POV performance issues. In Regulatory Issue Summary 2000-03, “Resolution of Generic Safety Issue (GSI) 158, ‘Performance of Safety Related Power-Operated Valves Under Design-Basis Conditions’,” dated March 15, 2000, the NRC closed GSI-158 by specifying attributes for an effective POV testing program that incorporates lessons learned from MOV research and testing programs. More recently, the NRC issued IN 2015-13, “Main Steam Isolation Valve Failure Events,” to alert nuclear power plant applicants and licensees to examples of operating experience where deficiencies in licensee processes and procedures can contribute to the failure of main steam isolation valves (MSIVs), which may be operated by air actuators or combined air/hydraulic actuators. The NRC considers that the improved IST provisions specified in Appendix IV to the ASME OM

Code will address the POV performance issues identified by operating experience with AOVs, including MSIVs, at nuclear power plants.

Paragraph IV-3800, “Risk-Informed AOV Inservice Testing,” allows the establishment of risk-informed AOV IST that incorporates risk insights in conjunction with functional margin to establish AOV grouping, acceptance criteria, exercising requirements, and testing intervals. Risk-informed AOV IST includes initial and periodic performance assessment testing of high-safety significant AOVs with the results of that testing used to confirm the capability of low-safety significant AOVs within the same AOV group. For example, paragraph IV-3600, “Grouping of AOVs for Performance Assessment Testing,” states that test results shall be evaluated for all AOVs in a group. Paragraph IV-6500, “Performance Assessment Test Corrective Action,” specifies that correction action be taken in accordance with the Owner’s corrective action requirements if AOV performance is unacceptable. The NRC considers that these provisions in Appendix IV will provide assurance that all AOVs within the scope of Appendix IV will be addressed for their operational readiness initially and on a periodic basis. The NRC is proposing to revise the last sentence of § 50.55a(b)(3) to specify that when implementing the ASME OM Code, conditions are applicable only as specified in (b)(3).

10 CFR 50.55a(b)(3)(ii) OM condition: Motor-Operated Valve (MOV) testing

The NRC proposes to amend § 50.55a(b)(3)(ii) to specify that the condition applies to the latest edition and addenda of the ASME OM Code incorporated by reference in § 50.55a(a)(1)(iv). This will allow future rulemakings to revise § 50.55a(a)(1)(iv) to incorporate the latest edition of the ASME OM Code without the need to revise § 50.55a(b)(3)(ii).

10 CFR 50.55a(b)(3)(iv) OM condition: Check valves (Appendix II)

The NRC proposes to amend § 50.55a(b)(3)(iv) to accept the use of Appendix II,

"Check Valve Condition Monitoring Program," in the 2017 Edition of the ASME OM Code without conditions based on its updated provisions. For example, Appendix II in the 2017 Edition of the ASME OM Code incorporates Table II, "Maximum Intervals for Use When Applying Interval Extensions," as well as other conditions currently specified in § 50.55a(b)(3)(iv). The NRC also proposes to update § 50.55a(b)(3)(iv) to apply Table II to Appendix II of the ASME OM Code, 2003 Addenda through the 2015 Edition. Further, the NRC proposes to remove the outdated conditions in paragraphs (b)(3)(iv) (A) through (D) based on their application to older editions and addenda of the ASME OM Code that are no longer applied at nuclear power plants, and on the incorporation of those conditions in recent editions and addenda of the ASME OM Code.

10 CFR 50.55a(b)(3)(viii) *OM condition: Subsection ISTE*

The NRC proposes to amend § 50.55a(b)(3)(viii) to specify that the condition on the use of Subsection ISTE, "Risk-Informed Inservice Testing of Components in Light-Water Reactor Nuclear Power Plants," applies to the latest edition and addenda of the ASME OM Code incorporated by reference in § 50.55a(a)(1)(iv). This will allow future rulemakings to revise § 50.55a(a)(1)(iv) to incorporate the latest edition of the ASME OM Code without the need to revise § 50.55a(b)(3)(viii).

10 CFR 50.55a(b)(3)(ix) OM condition: Subsection ISTF

The NRC proposes to amend § 50.55a(b)(3)(ix) to specify that Subsection ISTF, "Inservice Testing of Pumps in Water-Cooled Reactor Nuclear Power Plants – Post-2000 Plants," of the ASME OM Code, 2017 Edition, is acceptable without conditions. The NRC also proposes to amend § 50.55a(b)(3)(ix) to specify that licensees applying Subsection ISTF in the 2015 Edition of the ASME OM Code shall satisfy the requirements of Mandatory Appendix V,

"Pump Periodic Verification Test Program," of the ASME OM Code, in addition to the current requirement to satisfy Appendix V when applying Subsection ISTF in the 2012 Edition of the ASME OM Code. Subsection ISTF in the 2017 Edition of the ASME OM Code has incorporated the provisions from Appendix V such that this condition is not necessary for the 2017 Edition of the ASME OM Code.

10 CFR 50.55a(b)(3)(xi) OM condition: Valve Position Indication

The NRC proposes to amend § 50.55a(b)(3)(xi) for the implementation of paragraph ISTC-3700, "Position Verification Testing," in the ASME OM Code to apply to the 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in § 50.55a(a)(1)(iv). This will allow future rulemakings to revise § 50.55a(a)(1)(iv) to incorporate the latest edition and addenda of the ASME OM Code without the need to revise § 50.55a(b)(3)(xi). In addition, the NRC proposes to clarify that this condition applies to all valves with remote position indicators within the scope of Subsection ISTC, "Inservice Testing of Valves in Water-Cooled Reactor Nuclear Power Plants," including MOVs within the scope of Mandatory Appendix III, "Preservice and Inservice Testing Active Electric Motor-Operated Valve Assemblies in Water-Cooled Reactor Nuclear Power Plants." ISTC-3700 references Mandatory Appendix III for valve position testing of MOVs. The development of Mandatory Appendix III was intended to verify valve position indication as part of the diagnostic testing performed on the intervals established by the appendix. This clarification will ensure that verification of valve position indication is understood to be important for all valves with remote position indication addressed in Subsection ISTC and all of its mandatory appendices.

10 CFR 50.55a(b)(3)(xii) OM condition: Air-operated valves (Appendix IV)

The NRC proposes to include new § 50.55a(b)(3)(xii) to require the application of the

provisions in Appendix IV of the 2017 Edition of the ASME OM Code, when implementing the ASME OM Code, 2015 Edition. The new Appendix IV in the 2017 Edition of the ASME OM Code provides improved PST and IST of active AOVs within the scope of the ASME OM Code. This condition would provide consistency in the implementation of these two new editions of the ASME OM Code.

10 CFR 50.55a(f): Preservice and inservice testing requirements

The NRC regulations in § 50.55a(f) specify that systems and components of boiling and pressurized water-cooled nuclear power reactors must meet the requirements for preservice and inservice testing of the ASME BPV Code and ASME OM Code. Paragraph (f) in § 50.55a states that the requirements for inservice inspection of Class 1, Class 2, Class 3, Class MC, and Class CC components (including their supports) are located in paragraph (g) in § 50.55a. Applicants and licensees should note that requirements for inservice examination and testing of dynamic restraints (snubbers) are located in paragraph (b)(3)(v) in § 50.55a. The NRC staff is considering this clarification of the location of inservice examination and testing requirements for dynamic restraints in § 50.55a(f) and (g) for a future rulemaking.

10 CFR 50.55a(f)(4)(i): Applicable IST Code: Initial 120-month interval

Several stakeholders submitted public comments on the § 50.55a 2009-2013 proposed rule requesting that the time schedule for complying with the latest ASME Code edition and addenda in § 50.55a(f)(4)(i) and (g)(4)(i) for the IST and ISI programs, respectively, be relaxed from the current time interval of 12 months to a new time interval of 24 months prior to the applicable milestones in those paragraphs. The ASME reiterated this request during an NRC/ASME management public teleconference that was held on March 16, 2016. During that teleconference, ASME discussed the challenges associated with meeting the 12-month time

schedule in order to submit timely relief or alternative requests for NRC review. These comments were outside the scope of the proposed § 50.55a ASME 2009-2013 rule. However, the NRC staff indicated that the request would be considered in a future rulemaking.

In evaluating the suggested change, the NRC has determined that the primary benefit from the relaxation of this § 50.55a(f)(4)(i) requirement is that licensees of new nuclear power plants will have more time to prepare their initial IST program and procedures and any proposed relief or alternative requests to the applicable edition of the ASME OM Code. In preparing this proposed rule, the NRC has determined that relaxation of the time schedule for satisfying the latest edition of the ASME OM Code for the initial 120-month IST interval to be appropriate. However, the NRC considers that a 24-month time schedule would be contrary to the intent of the requirement to apply the latest edition of the ASME OM Code that is published every 24 months because it could result in licensees applying an outdated edition in the initial 120-month IST interval. Therefore, the NRC proposes to extend the time schedule to satisfy the latest edition and addenda of the ASME OM Code from the current 12 months to 18 months for the initial 120-month IST interval.

10 CFR 50.55a(f)(4)(ii): Applicable IST Code: Successive 120-month intervals

As discussed in the previous section, several stakeholders submitted public comments on the § 50.55a 2009-2013 proposed rule, requesting that the time schedule for complying with the latest ASME Code edition in § 50.55a(f)(4)(ii) and (g)(4)(ii) for the IST and ISI programs, respectively, be relaxed from the current time period of 12 months to a new time period of 24 months prior to the applicable milestones in those paragraphs. The ASME reiterated this request during an NRC/ASME management public teleconference that was held on March 16, 2016. During that teleconference, ASME discussed the challenges associated with meeting the 12-month time schedule in order to submit timely relief or alternative requests for NRC

review. These comments were outside the scope of the proposed § 50.55a ASME 2009-2013 rule. However, the NRC staff indicated that the proposed change would be considered for a future rulemaking. In evaluating the proposed change, the NRC has determined that the primary benefit from the relaxation of this § 50.55a(f)(4)(ii) requirement is that licensees of nuclear power plants will have more time to update their successive IST programs and procedures, and to prepare any proposed relief or alternative requests to the applicable edition of the ASME OM Code. In addition, licensees of each nuclear power plant will not need to review ASME OM Code editions incorporated by reference in § 50.55a after the relaxed 18-month time period before the start of the IST program interval compared to the 12-month time period required by the current regulations. In preparing this proposed rule, the NRC has determined that relaxation of the time schedule for satisfying the latest edition of the ASME OM Code for the successive 120-month IST interval to be appropriate. However, the NRC considers that a 24-month time schedule would be contrary to the intent of the requirement to apply the latest edition of the ASME OM Code that is published every 24 months. Therefore, the NRC proposes to extend the time schedule to satisfy the latest edition and addenda of the ASME OM Code from the current 12 months to 18 months for successive 120-month IST intervals.

10 CFR 50.55a(f)(7), Inservice testing reporting requirements

The NRC proposes to add § 50.55a(f)(7) to require nuclear power plant applicants and licensees to submit their IST Plans and interim IST Plan updates related to pumps and valves, and IST Plans and interim Plan updates related to snubber examination and testing to NRC Headquarters, the appropriate NRC Regional Office, and the appropriate NRC Resident Inspector.

The ASME OM Code states in paragraph (a) of ISTA-3200, “Administrative

Requirements," that IST Plans shall be filed with the regulatory authorities having jurisdiction at the plant site. However, the ASME is planning to remove this provision from the ASME OM Code in a future edition because this provision is more appropriate as a regulatory requirement rather than a Code requirement. This change is being proposed in this rulemaking rather than in a future rulemaking to ensure that there will not be a period of time when this requirement is not in effect. The NRC staff needs these IST Plans for use in evaluating relief and alternative requests, and deferral of quarterly testing to cold shutdowns and refueling outages. Therefore proposed condition is an administrative change that would relocate the provision from the ASME OM Code to § 50.55a.

10 CFR 50.55a(g)(4)(i): Applicable ISI Code: Initial 120-month interval

The NRC proposes to amend § 50.55a(g)(4)(i) to relax the time schedule for complying with the latest edition of the ASME BPV Code for the initial 120-month ISI program interval, respectively, from 12 months to 18 months. The basis for the relaxation of the time schedule discussed previously for the requirement in § 50.55a(f)(4)(i) to comply with the latest edition and addenda of ASME Section XI Code for the initial 120-month ISI program is also applicable to the relaxation of the time period for complying with the latest edition and addenda of the ASME BPV Code for the initial 120-month ISI program.

10 CFR 50.55a(g)(4)(ii): Applicable ISI Code: Successive 120-month intervals

The NRC proposes to amend § 50.55a(g)(4)(ii) to relax the time schedule for complying with the latest edition and addenda of the ASME BPV Code for the successive 120-month ISI program intervals, respectively, from 12 months to 18 months. The basis for the relaxation of the time schedule discussed above for the requirement in § 50.55a(f)(4)(ii) to comply with the latest edition and addenda of the ASME Section XI Code for the successive 120-month ISI

programs is also applicable to the relaxation of the time period for complying with the latest edition and addenda of the ASME BPV Code for the successive 120-month ISI programs. The NRC is proposing to amend the regulation in § 50.55a(g)(4)(ii) to provide up to an 18 month period for licensees to update their Appendix VIII program for those licensees whose ISI interval commences during the 12 through 18-month period after the effective date of this rule.

10 CFR 50.55a(g)(6)(ii)(C): Augmented ISI requirements: Implementation of Appendix VIII to Section XI

The NRC proposes to remove the language found in § 50.55a(g)(6)(ii)(C) from the current regulations. This paragraph describes requirements for initial implementation of older supplements in ASME BPV Code, Section XI Appendix VIII. Because the implementation dates have passed, and because licensees are no longer using these older editions and addenda of the Code that are referenced in this paragraph, the NRC proposes to remove the condition.

ASME BPV Code Case N-729-6

On September 10, 2008, the NRC issued a final rule to update § 50.55a to incorporate by reference the 2004 Edition of the ASME BPV Code (73 FR 52730). As part of the final rule, § 50.55a(g)(6)(ii)(D) implemented an augmented inservice inspection program for the examination of RPV upper head penetration nozzles and associated partial penetration welds. The program required the implementation of ASME BPV Code Case N-729-1, with certain conditions.

The application of ASME BPV Code Case N-729-1 was necessary because the inspections required by the 2004 Edition of the ASME BPV Code, Section XI were not written to address degradation caused by primary water stress corrosion cracking (PWSCC) of the

RPV upper head penetration nozzles and associated welds. The safety consequences of inadequate inspections of the subject nozzles can be significant. The NRC's determination that the ASME BPV Code-required inspections are inadequate is based upon operating experience and analysis, because nickel-based Alloy 600/82/182 material in the RPV head penetration nozzles and associated welds are susceptible to PWSCC. The absence of an effective inspection regime could, over time, result in unacceptable circumferential cracking, or the degradation of the RPV upper head or other reactor coolant system components by leakage-assisted corrosion. These degradation mechanisms increase the probability of a loss-of-coolant accident.

Examination frequencies and methods for RPV upper head penetration nozzles and welds are provided in ASME BPV Code Case N-729-1. The use of code cases is voluntary, so these provisions were developed, in part, with the expectation that the NRC would incorporate the code case by reference into § 50.55a. Therefore, the NRC adopted rule language in § 50.55a(g)(6)(ii)(D), requiring implementation of ASME BPV Code Case N-729-1, with conditions, in order to enhance the examination requirements in the ASME BPV Code, Section XI for RPV upper head penetration nozzles and welds. The examinations conducted in accordance with ASME BPV Code Case N-729-1 provide reasonable assurance that ASME BPV Code allowable limits will not be exceeded and that PWSCC will not lead to failure of the RPV upper head penetration nozzles or welds. However, the NRC concluded that certain conditions were needed in implementing the examinations in ASME BPV Code Case N-729-1. These conditions are set forth in § 50.55a(g)(6)(ii)(D).

On March 3, 2016, the ASME approved the sixth revision of ASME BPV Code Case N-729, (N-729-6). This revision changed certain requirements based on a consensus review of the inspection techniques and frequencies. These changes were deemed necessary by the ASME to supersede the previous requirements under previous versions of N-729 to establish

an effective long-term inspection program for the RPV upper head penetration nozzles and associated welds in PWRs. The major changes in the latest revisions are the inclusion of peening mitigation and extending the replaced head volumetric inspection frequency. Other minor changes were also made to address editorial issues and to clarify the code case requirements.

The NRC proposes to update the requirements of § 50.55a(g)(6)(ii)(D) to require licensees of PWRs to implement ASME BPV Code Case N-729-6, with certain conditions. The NRC conditions have been modified to address the changes in ASME BPV Code Case N-729-6 from the latest NRC-approved ASME Code Case N-729 revision in § 50.55a(g)(6)(ii)(D), revision 4, (N-729-4). The NRC's revisions to the conditions on ASME BPV Code Case N-729-4 that support the implementation of N-729-6 are discussed in the next sections.

10 CFR 50.55a(g)(6)(ii)(D) Augmented ISI requirements: *Reactor vessel head inspections*

The NRC proposes to revise the paragraphs in § 50.55a(g)(6)(ii)(D) as summarized in the following discussions, which identify the changes in requirements associated with the proposed update from ASME BPV Code Case N-729-4 to N-729-6. The major changes in the code case revision allowing peening as a mitigation method and extend the PWSCC-resistant RPV upper head inspection frequency from 10 years to 20 years. Additionally, the code case revision changed the volumetric inspection requirement for plants with previous indications of PWSCC and allowed the use of the similarities in sister plants to extend inspection intervals. The NRC is not able to fully endorse these two new items, therefore the NRC is proposing new conditions. The NRC has determined that one previous condition restricting the use of Appendix I of the code case could be relaxed. Further, the code case deadline for baseline examinations of February 10, 2008 is well in the past, therefore the NRC is proposing a condition that would ensure new plants can perform baseline examinations without the need for

an alternative to these requirements under § 50.55a(z). Finally, the NRC is proposing to add a condition that would allow other licensees to use a volumetric leak path assessment in lieu of a surface examination.

10 CFR 50.55a(g)(6)(ii)(D)(1) Implementation

The NRC proposes to revise § 50.55a(g)(6)(ii)(D)(*1*) to change the version of ASME BPV Code Case N-729 from N-729-4 to N-729-6 for the reasons previously set forth. Due to the incorporation of N-729-6, the date to establish applicability for licensed PWRs will be changed to anytime within one year of the effective date of the final rule. This is to allow some flexibility for licensees to implement the requirements. No new inspections are required, therefore this allows licensees to phase in the new program consistent with their needs and outage schedules. The NRC is also including wording to allow licensee's previous NRC-approved alternatives to remain valid. The NRC has completed a review of the currently effective proposed alternatives and finds that each effective proposed alternative can remain effective through the update from ASME Code Case N-729-4 to N-729-6 with the proposed NRC conditions.

10 CFR 50.55a(g)(6)(ii)(D)(2) Appendix I use

The NRC proposes to revise § 50.55a(g)(6)(ii)(D)(*2*). The NRC has determined that the current condition, that the use of Appendix I is not permitted, is no longer necessary. However the NRC is proposing a new condition that the analyses required by the code case for missed coverage both above and below the J groove weld include the analysis described in I-3000. The NRC's basis for revising the condition is that, based on its reviews of alternatives proposed by licensees related to this issue, over a period in excess of 10 years, it has become apparent to the NRC staff that the I-3000 method produces satisfactory results and is correctly

performed by licensees. The NRC also notes that the probabilistic approach has not been proposed by licensees and that it has not been evaluated (including the acceptance criteria) by the NRC.

The NRC staff finds the proposed change to the condition will have minimal impact on safety, while minimizing the regulatory burden of NRC review and approval of a standardized method to provide reasonable assurance of structural integrity of a reduced inspection area.

10 CFR 50.55a(g)(6)(ii)(D)(4) Surface exam acceptance criteria

The NRC proposes to revise § 50.55a(g)(6)(ii)(D), the current condition on surface examination acceptance criteria, to update the ASME BPV Code Case reference. The NRC proposes to modify the condition § 50.55a(g)(6)(ii)(D)(*4*) by changing the referenced version of the applicable ASME BPV Code Case N-729 from N 729-4 to N-729-6.

10 CFR 50.55a(g)(6)(ii)(D)(5) Peening

The NRC proposes to add a new condition that will allow licensees to obtain inspection relief for peening of their RPV upper heads in accordance with the latest NRC-approved requirements, contained in Electric Power Research Institute (EPRI), Materials Reliability Project (MRP) Topical Report, "Materials Reliability Program: Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement," (MRP-335, Revision 3-A) (ADAMS Accession No. ML16319A282). This document provides guidelines for the NRC-approved performance criteria, qualification requirements, inspection frequency, and scope. A licensee may peen any component in accordance with the requirements and limitations of the ASME Code. However, in order to obtain NRC-approved inspection relief for a RPV head mitigated with peening, as described in MRP-335, Revision 3-A, this proposed condition establishes MRP-335, Revision 3-A as the requirement for performance criteria, qualifications

and inspections. Otherwise the requirements of an unmitigated RPV upper head inspection program shall apply.

As part of this proposed condition, the NRC is removing two of the requirements contained in MRP-335, Revision 3-A: (1) the submission of a plant-specific alternative to the code case will not be required; and (2) Condition 5.4 will not be required.

Hence, the NRC's proposed condition combines the use of the latest NRC-accepted performance criteria, qualification and inspection requirements in MRP-335, Revision 3-A, would allow licensees to not have to submit a plant-specific proposed alternative to adopt the inspection frequency of peened RPV head penetration nozzles in MRP-335, Revision 3-A, and does not require licensees to adhere to NRC Condition 5.4 of MRP-335, Revision 3-A. By combining these points in the proposed condition, it alleviates the need to highlight nine areas in N-729-6 that do not conform to the current NRC-approved requirements for inspection relief provided in MRP-335, Revision 3-A.

Because the NRC proposes to require MRP-335, Revision 3-A, within this proposed condition on the requirements in the ASME Code Case, the NRC is incorporating by reference MRP-335, Revision 3-A, into § 50.55a(a)(4)(i).

10 CFR 50.55a(g)(6)(ii)(D)(6) Baseline Examinations

The NRC proposes to add a new condition to address baseline examinations. Note 7(c) of Table 1 of ASME BPV Code Case N-729-6 requires baseline volumetric and surface examinations for plants with an RPV upper head with less than 8 effective degradation years (EDY) by no later than February 10, 2008. This requirement has been in place since ASME BPV Code Case N-729-1 was first required by this section, and it was a carryover requirement from the First Revised NRC Order EA-03-009. However, since any new RPV upper head replacements would occur after 2008, this requirement can no longer be met. While it is not

expected that a new head using A600 nozzles would be installed, the NRC is conditioning this section to prevent the need for a licensee to submit a proposed alternative for such an event, should it occur. The NRC proposed condition would instead require a licensee to perform a baseline volumetric and surface examination within 2.25 reinspection years not to exceed 8 calendar years, as required under N-729-6, Table 1 for the regular interval of inspection frequency.

10 CFR 50.55a(g)(6)(ii)(D)(7) Sister plants

The NRC proposes to add a new condition to address the use of the term sister plants for the examinations of RPV upper heads. The use of "sister plants" under ASME BPV Code Case N-729-6 would allow extension of the volumetric inspection of replaced RPV heads with resistant materials from the current 10-year inspection frequency to a period of up to 40 years.

As part of mandating the use of ASME BPV Code Case N-729-6 in this proposed rule, the NRC is approving the ASME Code's extension of the volumetric inspection frequency from every 10 years to every 20 years. The NRC finds that the documents, "Technical Basis for Reexamination Interval Extension for Alloy 690 PWR Reactor Vessel Top Head Penetration Nozzles (MRP-375)" and improvement factors "Recommended Factors of Improvement for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) Growth Rates of Thick-Wall Alloy 690 Materials and Alloy 52, 152, and Variants Welds (MRP-386)," provide a sound basis for a 20-year volumetric inspection interval and a 5-year bare metal visual inspection interval for alloy 690/52/152 materials subject to this code case thereby providing reasonable assurance of the structural integrity of the RPV heads.

However, at the present time, the NRC is proposing a condition to prohibit the concept of "sister plants". If used, this concept would increase the inspection interval for plants with sisters from 20 years to 40 years. The NRC is currently evaluating both the definition of sister

plants and factors of improvement between the growth of PWSCC in alloys 600/82/182 and 690/52/152.

It is currently unclear to the NRC staff whether the criteria for sister plants (i.e., same owner) are appropriate criteria. The NRC staff also questions whether other criteria such as environment, alloy heat, and numbers of sister plants in a particular group should be included in the definition.

The NRC staff continues to review information on PWSCC growth rates and factors of improvement for alloy 690/52/152 and 600/82/182 as proposed in MRP-386. While the NRC staff has concluded that crack growth in alloy 690/52/152 is sufficiently slower than in alloy 600/82/182 to support an inspection interval of 20 years, work continues in assessing whether the data and analyses support a 40-year interval.

Public comments concerning both the definition of sister plants and crack growth rate factors of improvement are being solicited during the comment period of this proposed rule.

10 CFR 50.55a(g)(6)(ii)(D)(8) Volumetric leak path

The NRC proposes to add a new condition to substitute a volumetric leak path assessment for the required surface exam of the partial penetration weld of Paragraph -3200(b). The NRC finds that the use of a volumetric leak path assessment is more useful to confirm a possible leakage condition through the J-groove weld than a surface examination of the J-groove weld. While a surface examination may detect surface cracking, it will not confirm that such an indication is a flaw that caused leakage. A positive volumetric leak path assessment will provide a clear confirmation of leakage, either through the nozzle, weld or both. The NRC notes, that since all nozzles have had a volumetric examination, a baseline volumetric leak path assessment is available for comparison, and therefore provides additional assurance of effectiveness of the volumetric leak path assessment technique. As such, to

eliminate the need for potential proposed alternatives requiring NRC review and authorization, this condition is proposed to increase regulatory efficiency.

ASME BPV Code Case N-770-5

On June 21, 2011 (76 FR 36232), the NRC issued a final rule including § 50.55a(g)(6)(ii)(F), requiring the implementation of ASME BPV Code Case N-770-1, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS N86182 Weld Filler Material With or Without Application of Listed Mitigation Activities," with certain conditions. On November 7, 2016, the ASME approved the fifth revision of ASME BPV Code Case N 770 (N-770-5). The major changes from N-770-2, the last revision to be mandated by § 50.55a(g)(6)(ii)(F), to N-770-5 included extending the inspection frequency for cold leg temperature dissimilar metal butt welds greater than 14-inches in diameter to once per inspection interval not to exceed 13 years, performance criteria and inspections for peening mitigated welds, and inservice inspection requirements for excavate and weld repair mitigations. Minor changes were also made to address editorial issues, to correct figures, or to add clarity. The NRC finds that the updates and improvements in N-770-5 are sufficient to update § 50.55a(g)(6)(ii)(F).

The NRC, therefore, is updating the requirements of § 50.55a(g)(6)(ii)(F) to require licensees to implement ASME BPV Code Case N-770-5, with conditions. The previous NRC conditions have been modified to address the changes in ASME BPV Code Case N-770-5 and to ensure that this regulatory framework will provide adequate protection of public health and safety. The following sections discuss each of the NRC's revisions to the conditions on ASME BPV Code Case N-770-2 that support the implementation of N-770-5.

10 CFR 50.55a(g)(6)(ii)(F)(1) Augmented ISI requirements: Examination requirements for Class 1 piping and nozzle dissimilar-metal butt welds—(1) Implementation

The NRC proposes to revise this condition to mandate the use of ASME BPV Code Case N-770-5, as conditioned by this section, in lieu of the current requirement to mandate ASME BPV Code Case N-770-2. The wording of this condition will allow a licensee to adopt this change anytime during the first year after the publication of the final rule. This is to provide flexibility for a licensee to adapt to the new requirements. Finally, included in this provision is an allowance for all previous NRC-approved licensee's alternatives to the requirements of this section to remain valid, regardless of the version of ASME BPV Code Case N-770 they were written against. The NRC has reviewed all currently applicable licensee alternatives to this code case and has found that the change from Code Case N-770-2 to N-770-5 required by this proposed regulation neither invalidates nor degrades plant safety associated with the continued use of existing alternatives. Therefore, to provide regulatory efficiency, the NRC finds that all previous NRC-approved alternatives will remain valid for their specifically NRC-approved duration of applicability.

10 CFR 50.55a(g)(6)(ii)(F)(2) Categorization

The NRC proposes to revise this condition to include the categorization of welds mitigated by peening. This condition currently addresses the categorization for inspection of unmitigated welds and welds mitigated by various processes.

The new section, to this revised condition, is to categorize dissimilar metal butt welds mitigated by peening. "Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement," MRP-335, is the technical basis summary document for the application of peening in upper heads and dissimilar metal butt welds to address primary water stress corrosion cracking. The NRC conducted a comprehensive review of this document for

generic application. The requirements contained in the NRC-approved version of this report, MRP-335, Revision 3-A differ in several respects from the requirements contained in ASME BPV Code Case N-770-5. As such, to avoid confusion with multiple conditions, the NRC proposes to accept categorization of welds as being mitigated by peening, if said peening follows the performance criteria, qualification requirements, and inspection guidelines of MRP-335, Revision 3-A. Once implemented, the inspection guidelines of MRP-335, Revision 3-A would provide inspection relief from the requirements of an unmitigated dissimilar metal butt weld. As part of this proposed condition, the NRC is removing the need for the licensee to submit a plant-specific proposed alternative to implement the inspection relief in accordance with MRP-335, Revision 3-A.

Because MRP-335, Revision 3-A, is being proposed to be used as a condition against the requirements in the ASME Code Case, the NRC is incorporating by reference MRP-335, Revision 3-A, into § 50.55a(a)(4)(i).

The requirements for categorization of all other mitigated or non-mitigated welds remain the same.

As noted previously, all of these requirements, except for the categorization of peening, were in the previous conditions for mandated use of ASME BPV Code Cases N-770-2 and N-770-1.

10 CFR 50.55a(g)(6)(ii)(F)(3) Baseline examinations

The NRC proposes to delete this condition. The current condition regarding baseline inspections was considered unnecessary, as all baseline volumetric examinations are expected to have been completed. If a baseline examination is required, the licensee can follow the examination requirements in ASME BPV Code Case N-770-5. This condition number is reserved, to maintain the NRC condition numbering from the past rulemaking, and in this way,

limit the need for additional updates to current procedures and documentation, when no substantive change has occurred.

10 CFR 50.55a(g)(6)(ii)(F)(4) Examination coverage

The NRC proposes to revise this condition to make an editorial change to update the reference to ASME BPV Code Case N-770-2 to N-770-5.

10 CFR 50.55a(g)(6)(ii)(F)(6) Reporting requirements

The NRC proposes to revise this condition to address the deletion of wording in Paragraph -3132.3(d) of ASME BPV Code Case N-770-5 and relax the requirement for submitting the summary report to the NRC. The purpose of this condition is to obtain timely notification of unanticipated flaw growth in a mitigated butt weld in the reactor coolant pressure boundary. While NRC onsite and regional inspectors provide a plant-specific role in assessing the current safe operation of a specific plant, the NRC staff in the Office of Nuclear Reactor Regulation is also responsible for assessing the generic impact of the potential reduced effectiveness of a mitigation technique across the fleet. In order to address these concerns, the NRC has found that, in the event that a dissimilar metal butt weld is degraded, it is necessary for the NRC staff to obtain timely notification of the flaw growth and a report summarizing the evaluation, along with inputs, methodologies, assumptions, and causes of the new flaw or flaw growth within 30 days of the plant's return to service. This is a relaxation from the previous requirement to provide a report prior to entering mode 4 prior to plant startup. In its review of the prior condition, the NRC has determined that the burden associated with the submission of a report prior to entry into mode 4 exceeded the immediate safety benefit from the report. The NRC also has determined that a timely notification regarding the event was sufficient to begin the determination of whether an immediate generic safety concern exists.

Further, the NRC has found the submittal of a report within 30 days is both necessary and sufficient to allow for the evaluation of any long-term impacts of the flaw growth on the overall inspection programs for that specific mitigation type.

The NRC has found that the deletion of the following sentence from Paragraph -3132.3(d), “Any indication in the weld overlay material characterized as stress corrosion cracking is unacceptable,” did not have a sufficiently identified technical basis to support its removal. Given that the NRC’s approval of weld overlays is based on the resistance of the overlay material to cracking, any flaw growth into this material should call into question the effectiveness of that specific mitigation method. However, the NRC recognizes that there could be instances were NDE measurement uncertainty may require a conservative call on flaw size that may lead to the assumption of flaw growth. Rather than automatically assume this flaw growth is unacceptable, as stated in the previous requirement mandated under ASME BPV Code Case N-770-2, the NRC has found that reasonable assurance of plant safety could be assured by reporting this condition to the NRC for evaluation, in accordance with this condition. This relaxation of the previous requirement allows for regulatory flexibility in assessing the safety significance of any potential flaw growth.

10 CFR 50.55a(g)(6)(ii)(F)(9) Deferral

The NRC proposes to revise this condition to address the potential deferrals of volumetric inspections for welds mitigated by peening as well as for welds mitigated by the excavate and weld technique. Volumetric inspections performed once per interval or on a ten-year basis can, in some instances, be deferred to the end of the current ten-year inservice inspection interval. As such, this could allow an inspection frequency, which is assumed to be approximately 10 years to be extended to as much as 20 years. While there are certain conditions that would warrant such an extension, the NRC finds, in the following two instances,

that allowing such deferrals would provide an unacceptable reduction in the margin for safety.

For welds peened in accordance with the performance and qualification criteria of MRP-335, Revision 3-A, the long-term inservice inspection interval, as required by MRP-335, Revision 3-A Table 4-1, is once per inspection interval. Note 11 of Table 4-1 would allow deferral of peened welds beyond the 10-year inspection frequency. This deferral would be beyond the NRC technical basis of Paragraph 4.6.3 in the NRC Safety Evaluation of MRP-335, Revision 3-A. Therefore, the NRC proposes to revise this condition to prohibit the deferral of examinations of peened welds, without the submission of a plant-specific proposed alternative for NRC review and approval.

For welds mitigated with the excavate and weld repair technique, specifically inspection items M-2, N-1 and N-2, Note 11 of Table 1 of ASME BPV Code Case N-770-5 would allow the deferral of the second inservice examination to the end of the 10-year inservice inspection interval. The NRC finds the deferral of the second inservice exam unacceptable. If a weld was mitigated near the end of a 10-year inservice inspection interval, the first post mitigation examination might occur at the beginning of the next 10-year inservice inspection interval. Since the welds are required to be examined once per interval, the second post mitigation exam would be in the next interval. Because Note 11 allows the exams to be deferred, in such cases, it could approach twenty years between the first and second post mitigation exams. The NRC finds that a requirement to perform a second post mitigation exam within 10 years of the initial post mitigation exam to be more consistent with the reinspection timeline for other mitigations, such as full structural weld overlay and is therefore acceptable to the NRC. However, the NRC finds that, after the initial and second post mitigation examinations, provided the examination volumes show no indications of crack growth or new cracking, allowance for deferral of examination of these welds, as deemed appropriate, by the plant owner is acceptable. As such, this proposed condition only restricts the deferral of the second

inservice examination.

Given the two new issues identified above, the NRC proposes to revise NRC Condition § 50.55a (g)(6)(ii)(F)(9) *Deferral* to prohibit the deferral of volumetric inspections of welds mitigated by peening under MRP-335, Revision 3-A and the first 10-year inservice inspection examination for welds mitigated by the excavate and weld repair technique, inspection items M-2, N-1 and N-2 only.

10 CFR 50.55a(g)(6)(ii)(F)(10) Examination technique

The NRC proposes to revise this condition to make an editorial change to update the reference to ASME BPV Code Case N-770-2 to N-770-5.

10 CFR 50.55a(g)(6)(ii)(F)(11) Cast stainless steel

The NRC proposes to amend § 50.55a(g)(6)(ii)(F)(11) to provide licensees with an alternative to meeting the current condition. The alternative would be to use ASME Code Case N-824 when examining dissimilar metal welds where inspections through a cast austenitic stainless steel component is required. The existing condition requires licensees to have a qualified program in place to inspect dissimilar metal butt welds with CASS materials from the CASS side by 2022. The NRC recognizes that there is no current Supplement 9 inspection guideline that would meet this requirement. At an NRC public meeting on April 17, 2018, the NRC and industry representatives discussed the estimated number of welds that would be covered by the condition. Given this information, the NRC has determined that rather than requiring a full qualification program to be developed within this timeframe, ASME Code Case N-824 would provide an acceptable alternative and provide reasonable assurance of public health and safety.

ASME BPV Code Case N-824 incorporates best practices for the inspection of cast stainless steel from NUREG/CR-7122 and NUREG/CR-6933. NUREG/CR-7122 showed that

pressurizer surge line sized piping welds may be inspectable with existing dissimilar metal butt weld inspection procedures. NUREG/CR-6933 showed that large-bore cast stainless steel may be inspectable using specialized low-frequency inspection procedures. Therefore, the NRC will modify the condition to allow the use of ASME Code Case N-824, as conditioned in RG 1.147, as an option to the development of Appendix VIII, Supplement 9 or similar qualifications, or, when examining dissimilar metal welds where inspections through a cast austenitic stainless steel component is required to obtain volumetric inspection coverage.

10 CFR 50.55a(g)(6)(ii)(F)(13) Encoded ultrasonic examination

The NRC proposes to revise this current condition, which requires the encoded examination of unmitigated and mitigated cracked butt welds under the scope of ASME BPV Code Case N-770-5. In particular, the proposed revision is being expanded to address changes in ASME BPV Code Case N-770-5 to include inspection categories B-1, B-2 for cold leg welds, which were previously under the single inspection category B, and the new inspection categories N-1, N-2 and O for cracked welds mitigated with the excavate and weld repair technique. The inclusion of these weld categories is in line with the previous basis for this condition.

Further, the NRC proposes to relax the requirement for 100 percent of the required inspection volume to be encoded. The new requirement would allow essentially 100 percent of the required inspection volume to be encoded under the definition of essentially 100 percent in ASME BPV Code Case N-460. This code case allows the reduction to 90 percent coverage only if a physical limitation or impediment to full coverage is encountered during the inspection. The NRC finds this relaxation appropriate, given the potential that the physical size of the encoding equipment may reduce attainable coverage, when compared to manual techniques. The NRC staff finds that the reduction in safety associated with this potential minor decrease in

coverage is minimal. Adoption of the revised proposed condition will reduce unnecessary preparation and submittal of requests for NRC review and approval of alternatives to this requirement.

10 CFR 50.55a(g)(6)(ii)(F)(14) Excavate and weld repair cold leg

The NRC proposes to add a new condition to address the initial inspection of cold leg operating temperature welds after being mitigated by the excavate and weld repair technique. The excavate and weld repair technique is a new mitigation category introduced in ASME BPV Code Case N-770-5. The first inspection requirement for inspection item M-2, N-1 and N-2 welds, after being mitigated, is during the 1st or 2nd refueling outages after mitigation. The NRC finds that the ASME BPV Code Case N-770-5 language does not provide separate inspection programs between the cold leg and the hot leg temperature for the first volumetric inspection. The NRC determines that, at hot leg temperatures, one fuel cycle is sufficient for a preexisting, nondetectable, crack to grow to detectable size (10 percent through wall). However, at cold leg temperatures, crack growth is sufficiently slow that preexisting, undetected, cracks are unlikely to reach detectable size in a single fuel cycle. Therefore, in order to ensure the effectiveness of the initial volumetric examination to verify no unanticipated flaw growth in the mitigated weld prior to extending the inspection frequency to 10 years or beyond, the NRC proposes to add a condition to require the first examination to be performed during the second refueling outage following the mitigation of cold leg operating temperature welds.

10 CFR 50.55a(g)(6)(ii)(F)(15) Cracked excavate and weld repair

The NRC proposes to add a new condition to address the long-term inspection frequency of cracked welds mitigated by the excavate and weld repair technique, i.e. inspection category N-1. The long-term volumetric inspection frequency for the cracked N-1 welds under

ASME BPV Code Case N-770-5 is a 25 percent sample each 10-year inspection interval. In comparison, the NRC notes that the long-term volumetric inspection frequency of a non-cracked weld mitigated with the excavate and weld repair technique without stress improvement (inspection category M-2) is 100 percent each 10-year inspection interval. Due to not attaining surface stress improvement, M-2 welds could potentially have cracking initiate at any time over the remaining life of the repair. Therefore, a volumetric inspection frequency of once per 10-year inspection frequency is warranted to verify weld structural integrity. However, every N-1 categorized weld already has a pre-existing crack, but Code Case N-770-5 would allow a 25 percent sample inspection frequency each 10-year inservice inspection interval. This could allow some N-1 welds with preexisting flaws to not be volumetrically inspected for the remainder of plant life. The NRC finds insufficient technical basis to support the difference in inspection frequency between N-1 and M-2 welds. Therefore, the NRC proposes a condition on N-1 inspection category welds that would require the same long-term inspection frequency, as that determined acceptable by the ASME BPV Code Case N-770-5 for M-2 welds, i.e., non-cracked 360 degree excavate and weld repair with no stress improvement credited.

10 CFR 50.55a(g)(6)(ii)(F)(16) Partial arc excavate and weld repair

The NRC proposes to add a new condition to prevent the use of the inspection criteria for partial arc excavate and weld repair technique contained in ASME BPV Code Case N-770-5. The NRC staff notes that ASME BPV Code Case N-847 which describes the process of installing an excavate and weld repair has not been included in RG 1.147 and has not been incorporated by reference into § 50.55a. As a result, licensees must propose an alternative to the ASME Code to make a repair using the excavate and weld repair technique. Therefore, preventing the use of the inspection criteria contained in ASME BPV Code Case N-770-5, proposes no additional burden on the licensee when viewed in light of the requirement to

propose an alternative to the ASME BPV Code to use the excavate and weld repair technique. The NRC's basis for this condition is that initial research into stress fields and crack growth associated with the ends of the repair indicated that the potential for crack growth rates to exceed those expected in the absence of the repair. The NRC also notes that there is potential for confusion regarding the inspection interval for these welds associated with whether Note 5 can be applied.

IV. Section-by-Section Analysis

Paragraph (a)(1)(i)

This proposed rule would revise paragraph (a)(1)(i) by removing the abbreviation definition for ASME BPV Code in the first sentence.

Paragraph (a)(1)(i)(E)

This proposed rule would add new paragraphs (a)(1)(i)(E)(*18*) and (*19*) to include the 2015 and 2017 Editions of the ASME BPV Code.

Paragraph (a)(1)(ii)

This proposed rule would revise paragraphs (a)(1)(ii) to remove the acronym "BPV" and replace it with "Boiler and Pressure Vessel."

Paragraph (a)(1)(ii)(C)

This proposed rule would revise paragraphs (a)(1)(ii)(C)(52) and (53) to remove parenthetical language and would add new paragraphs (a)(1)(ii)(C)(54) and (55) to include the 2015 and 2017 Editions of the ASME BPV Code.

Paragraph (a)(1)(iii)(C)

This proposed rule would revise the reference from Code Case N-729-4 to N-729-6.

Paragraph (a)(1)(iii)(D)

This proposed rule would revise the reference from Code Case N-770-2 to N-770-5.

Paragraph (a)(1)(iv)

This proposed rule would remove parenthetical language from paragraph (a)(1)(iv).

Paragraph (a)(1)(iv)(C)

This proposed rule would add new paragraphs (a)(1)(iv)(C)(2) and (3) to include the 2015 and 2017 Editions of the ASME BPV Code.

Paragraph (a)(4)

This proposed rule would add a new paragraph (a)(4) to incorporate by reference the Electric Power Research Institute, Materials Reliability Program, 3420 Hillview Avenue, Palo Alto, CA 94304-1338; telephone: 1-650-855-2000; http://www.epri.com.

Paragraph (a)(4)(i)

This proposed rule would add a new paragraph (a)(4)(i) to incorporate by reference the Materials Reliability Program: Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement (MRP-335, Revision 3-A), EPRI approval date: November 2016. Paragraph (a)(4)(ii) would be added and resereved.

Paragraph (b)(1)

This proposed rule would change the reference from the 2013 to the 2017 Edition of the

ASME BPV Code.

Paragraph (b)(1)(ii)

This proposed rule would change the word “Note” to “Footnote” in Table 1 of paragraph (b)(1)(ii) and revise the last reference in the table from the 2013 Edition to the 2017 Edition of the ASME BPV Code.

Paragraph (b)(1)(iii)

This proposed rule would change the references from the 2008 Addenda to the 2017 Edition of the ASME BPV Code.

Paragraph (b)(1)(v)

This proposed rule would revise paragraph (b)(1)(v) to limit the condition so that it applies only for the 1995 Edition through the 2009b Addenda of the 2007 Edition, where the NQA-1-1994 Edition is incorporated by reference in paragraph (a)(1) of this section.

Paragraph (b)(1)(vi)

This proposed rule would revise paragraph (b)(1)(vi) to replace “the latest edition and addenda” with “all editions and addenda up to and including the 2013 Edition.”

Paragraph (b)(1)(vii)

This proposed rule would revise paragraph (b)(1)(vii) to replace “the 2013 Edition” with “all editions and addenda up to and including the 2017 Edition.”

Paragraph (b)(1)(x)

This proposed rule would add new paragraph (b)(1)(x) and its subparagraphs (A) and

(B) to include two conditions necessary to maintain adequate standards for visual examinations of bolts, studs, and nuts.

Paragraph (b)(1)(xi)

This proposed rule would add new paragraph (b)(1)(xi) and its subparagraphs (A) through (E) to include five conditions that are necessary to install safety-related Class 3 HDPE pressure piping in accordance with ASME BPV Code, Section III, Mandatory Appendix XXVI. The first two conditions apply to the 2015 and 2017 Editions of Section III. The third, fourth, and fifth conditions apply only to the 2017 Edition of Section III.

Paragraph (b)(1)(xii)

This proposed rule would add new paragraph (b)(1)(xii) which applies to the use of certifying engineers.

Paragraph (b)(2)

This proposed rule would revise paragraph (b)(2) to change the reference from the 2013 Edition to the 2017 Edition of the ASME BPV Code.

Paragraph (b)(2)(vi)

This proposed rule would remove and reserve paragraph (b)(2)(vi).

Paragraph (b)(2)(vii)

This proposed rule would remove and reserve paragraph (b)(2)(vii).

Paragraph (b)(2)(ix)

This proposed rule would revise paragraph (b)(2)(ix) to add references to new paragraph (b)(2)(ix)(K) of this section, where applicable. It would also replace “the latest edition and addenda” with “the 2015 Edition.”

Paragraph (b)(2)(ix)(K)

This proposed rule would add new paragraph (b)(2)(ix)(K) to require visual examination of the moisture barrier materials installed in containment leak chase channel system closures at concrete floor interfaces. This condition will be applicable to all editions and addenda of Section XI, Subsection IWE, of the ASME BPV Code, prior to the 2017 Edition, that are incorporated by reference in paragraph (b) of this section.

Paragraph (b)(2)(xvii)

This proposed rule would remove and reserve paragraph (b)(2)(xvii).

Paragraph (b)(2)(xviii)(D)

This proposed rule would revise paragraph (b)(2)(xviii)(D) to extend the applicability to users of the latest edition incorporated by reference in paragraph (a)(1)(ii) of this section.

Paragraph (b)(2)(xx)(B)

This proposed rule would revise paragraph (b)(2)(xx)(B) to clarify the NRC’s expectations for system leakage tests performed in lieu of a hydrostatic pressure test, following repair/replacement activities performed by welding or brazing on a pressure retaining boundary using the 2003 Addenda through the latest edition and addenda of ASME BPV Code, Section XI incorporated by reference in paragraph (a)(1)(ii) of this section.

Paragraph (b)(2)(xx)(C)

This proposed rule would add new paragraph (b)(2)(xx)(C) and subparagraphs (1) and (2) to include two conditions on the use of the alternative BWR Class 1 system leakage test described in IWA-5213(b)(2), IWB-5210(c) and IWB-5221(d) of the 2017 Edition of ASME BPV Code, Section XI.

Paragraph (b)(2)(xxi)(A)

This proposed rule would remove and reserve paragraph (b)(2)(xxi)(A).

Paragraph (b)(2)(xxi)(B)

This proposed rule would add new paragraph (b)(2)(xxi)(B) and its subparagraphs (1) through (3) that will include conditions on the use of the provisions of IWB-2500(f) and (g) and Notes 6 and 7 of Table IWB-2500-1 of the 2017 Edition of ASME BPV Code, Section XI.

Paragraph (b)(2)(xxv)

This proposed rule would revise paragraph (b)(2)(xxv) introductory text and add new subparagraphs (A) and (B) that would prohibit the use of IWA-4340 in Section XI editions and addenda earlier than the 2011 Edition and would allow the use of IWA-4340 in addenda and editions from the 2011 Addenda through the latest edition incorporated by reference in this section under certain conditions.

Paragraph (b)(2)(xxvi)

This proposed rule would revise paragraph (b)(2)(xxvi) to clarify the NRC's expectations for pressure testing of ASME BPV Code Class 1, 2, and 3 mechanical joints disassembled and reassembled during the performance of an ASME BPV Code, Section XI activity.

Paragraph (b)(2)(xxxii)

This proposed rule would revise the reporting requirements in paragraph (b)(2)(xxxii).

Paragraph (b)(2)(xxxiv)

This proposed rule would revise paragraph (b)(2)(xxxiv) and its subparagraph (B) to extend the applicability from the 2013 Edition through the latest edition incorporated by reference in paragraph (a)(1)(ii) of this section.

Paragraph (b)(2)(xxxv)

This proposed rule would revise paragraph (b)(2)(xxxv) to designate the introductory text of paragraph (b)(2)(xxxv) minus the paragraph heading as subparagraph (A) and it would also add new subparagraph (B).

Paragraph (b)(2)(xxxvi)

This proposed rule would revise the condition in paragraph (b)(2)(xxxvi) to also include the use of the 2015 and 2017 Editions of ASME BPV Code, Section XI.

Paragraph (b)(2)(xxxviii)

This proposed rule would add new paragraph (b)(2)(xxxviii) and its subparagraphs (A) and (B) that contain two conditions on the use of ASME BPV Code, Section XI, Appendix III, Supplement 2.

Paragraph (b)(2)(xxxix)

This proposed rule would add new paragraph (b)(2)(xxxix) and its subparagraphs (A)

and (B) that contain conditions on the use of IWA-4421(c)(1) and IWA-4421(c)(2) of Section XI, in the 2017 Edition.

Paragraph (b)(2)(xl)

This proposed rule would add new paragraph (b)(2)(xl) to include the requirements for the prohibitions on the use of IWB-3510.4(b).

Paragraph (b)(2)(xli)

This proposed rule would add new paragraph (b)(2)(xli) to include the requirements for the prohibitions on the use of IWB-3112(a)(3) and IWC-3112(a).

Paragraph (b)(2)(xlii)

This proposed rule would add new paragraph (b)(2)(xlii) to include the requirements for the use of the provisions in Table IWB-2500-1, Examination Category B-F, Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles, Item B5.11 and Item B5.71.

Paragraph (b)(3)

This proposed rule would revise paragraph (b)(3) to include Appendix IV in the list of Mandatory Appendices and it would also remove the reference to the “2012 Edition” and replace it with “the latest edition and addenda of the ASME OM Code incorporated by reference.” It would also revise the last sentence in the paragraph for clarity.

Paragraph (b)(3)(ii)

This proposed rule would revise paragraph (b)(3)(ii) to remove the reference to the “2011 Addenda, and 2012 Edition” and replace it with “the latest edition and addenda of the

ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section."

Paragraph (b)(3)(iv)

This proposed rule would revise paragraph (b)(3)(iv) to update the conditions for use of Appendix II of the ASME OM Code, 2003 Addenda through the 2015 Edition.

Paragraph (b)(3)(viii)

This proposed rule would revise paragraph (b)(3)(viii) to remove the reference to the "2011 Addenda, or 2012 Edition" and replace it with "the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section."

Paragraph (b)(3)(ix)

This proposed rule would revise paragraph (b)(3)(ix) to update the conditions for use of Subsection ISTF of the ASME OM Code, through the 2012 Edition or 2015 Edition.

Paragraph (b)(3)(xi)

This proposed rule would revise paragraph (b)(3)(xi) to extend the applicability of the reference to the ASME OM Code, 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv). It would also provide additional clarity regarding obturator positions for valves with remote position indication.

Paragraph (b)(3)(xii)

This proposed rule would add a new paragraph (b)(3)(xii) for air-operated valves (Appendix IV).

Paragraphs (f)(4)(i) and (ii)

This proposed rule would revise paragraphs (f)(4)(i) and (ii) to change the time frame for complying with the latest edition and addenda of the ASME OM Code from 12 months to 18 months, both for the initial and successive IST programs.

Paragraph (f)(7)

This proposed rule would add new paragraph (f)(7) to include the requirements for inservice testing reporting.

Paragraph (g)(4)

This proposed rule would revise paragraph (g)(4) to remove the phrase “subject to the condition referenced in paragraph (b)(2)(vi) of this section.”

Paragraph (g)(4)(i)

This proposed rule would revise paragraph (g)(4)(i) to change the time frame for complying with the latest edition and addenda of the ASME BPV Codes, from 12 months to 18 months, for ISI programs.

Paragraph (g)(4)(ii)

This proposed rule would revise paragraph (g)(4)(ii) to change the time frames for complying with the latest edition and addenda of the ASME BPV Codes, from 12 months to 18 months, for successive ISI programs. It also would remove the date of August 17, 2017, and replace that date with the effective date of the final rule.

Paragraph (g)(6)(ii)(C)

This proposed rule would remove and reserve paragraph (g)(6)(ii)(C).

Paragraph (g)(6)(ii)(D)(1)

This proposed rule would revise paragraph (g)(6)(ii)(D)(*1*) to remove the date of August 17, 2017, and replace that date with the effective date of the final rule. It would also update the reference from Code Case N-729-4 to Code Case N-729-6. It would also be revised to include the conditions in paragraphs (*2*) through (*8*) and that licensees must be in compliance with these conditions by no later than 1 year from the effective date of the final rule.

Paragraph (g)(6)(ii)(D)(2)

This proposed rule would revise paragraph (g)(6)(ii)(D)(*2*) in its entirety.

Paragraph (g)(6)(ii)(D)(4)

This proposed rule would revise paragraph (g)(6)(ii)(D)(*4*) to update the reference to ASME BPV Code Case N-729 from revision 4 to revision 6.

Paragraphs (g)(6)(ii)(D)(5) through (8)

This proposed rule would add new paragraphs (g)(6)(ii)(D)(*5*) through (*8*) to include the requirements for peening, baseline examinations, sister plants, and volumetric leak path.

Paragraph (g)(6)(ii)(F)(1)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*1*) to remove the date of August 17, 2017, and replace that date with the effective date of the final rule. It would also update the reference from Code Case N-770-2 (revision 2) to Code Case N-770-5 (revision 5). It would also be revised to include the conditions in paragraphs (g)(6)(ii)(F)(*2*) through (*16*) of this

section and that licensees must be in compliance with these conditions by no later than 1 year from the effective date of the final rule.

Paragraph (g)(6)(ii)(F)(2)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*2*) to include subparagraphs (i) through (v).

Paragraph (g)(6)(ii)(F)(3)

This proposed rule would remove and reserve paragraph (g)(6)(ii)(F)(*3*).

Paragraph (g)(6)(ii)(F)(4)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*4*) to change the reference from ASME BPV Code Case N-770-2 (revision 2) to Code Case N-770-5 (revision 5).

Paragraph (g)(6)(ii)(F)(6)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*6*) to provide greater clarity of the requirements that must be met.

Paragraph (g)(6)(ii)(F)(9)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*9*) to include subparagraphs (i) through (iii).

Paragraph (g)(6)(ii)(F)(10)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*10*) from ASME BPV Code Case

N-770-2 (revision 2) to N-770-5 (revision 5).

Paragraph (g)(6)(ii)(F)(11)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*11*) to include an alternative to meeting the current condition.

Paragraph (g)(6)(ii)(F)(13)

This proposed rule would revise paragraph (g)(6)(ii)(F)(*13*) to include inspection categories B-1, B-2, N-1, N-2 and O.

Paragraph (g)(6)(ii)(F)(14) through (16)

This proposed rule would add new paragraphs (g)(6)(ii)(F)(*14*) through (*16*) to contain the new requirements: excavate and weld repair cold leg, cracked excavate and weld repair, and partial arc excavate and weld repair.

V. Generic Aging Lessons Learned Report

Background

In December 2010, the NRC issued "Generic Aging Lessons Learned (GALL) Report," NUREG-1801, Revision 2 (ADAMS Accession No. ML103490041), for applicants to use in preparing license renewal applications. The GALL report provides aging management programs (AMPs) that the NRC has concluded are sufficient for aging management in accordance with the license renewal rule, as required in § 54.21(a)(3). In addition, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," NUREG-

1800, Revision 2 (ADAMS Accession No. ML103490036), was issued in December 2010, to ensure the quality and uniformity of NRC staff reviews of license renewal applications and to present a well-defined basis on which the NRC staff evaluates the applicant's aging management programs and activities. In April 2011, the NRC also issued "Disposition of Public Comments and Technical Bases for Changes in the License Renewal Guidance Documents NUREG-1801 and NUREG-1800," NUREG-1950 (ADAMS Accession No. ML11116A062), which describes the technical bases for the changes in Revision 2 of the GALL report and Revision 2 of the standard review plan (SRP) for review of license renewal applications.

Revision 2 of the GALL report, in Sections XI.M1, XI.S1, XI.S2, XI.M3, XI.M5, XI.M6, XI.M11B and XI.S3, describes the evaluation and technical bases for determining the sufficiency of ASME BPV Code Subsections IWB, IWC, IWD, IWE, IWF, or IWL for managing aging during the period of extended operation (i.e., up to 60 years of operation). In addition, many other AMPs in the GALL report rely, in part but to a lesser degree, on the requirements specified in the ASME BPV Code, Section XI. Revision 2 of the GALL report also states that the 1995 Edition through the 2004 Edition of the ASME BPV Code, Section XI, Subsections IWB, IWC, IWD, IWE, IWF, or IWL, as modified and limited by § 50.55a, were found to be acceptable editions and addenda for complying with the requirements of § 54.21(a)(3), unless specifically noted in certain sections of the GALL report. The GALL report further states that future *Federal Register* documents that amend § 50.55a will discuss the acceptability of editions and addenda more recent than the 2004 Edition for their applicability to license renewal. In a final rule issued on June 21, 2011 (76 FR 36232), subsequent to Revision 2 of the GALL report, the NRC also found that the 2004 Edition with the 2005 Addenda through the 2007 Edition with the 2008 Addenda of Section XI of the ASME BPV Code, Subsections IWB, IWC, IWD, IWE, IWF, or IWL, as subject to the conditions in § 50.55a, are acceptable for the AMPs in the GALL report and the conclusions of the GALL report remain valid with the

augmentations specifically noted in the GALL report. In a final rule issued on July 18, 2017 (82 FR 32934), the NRC further finds that the 2009 Addenda through the 2013 Edition of Section XI of the ASME BPV Code, Subsections IWB, IWC, IWD, IWE, IWF, or IWL, as subject to the conditions in § 50.55a, will be acceptable for the AMPs in the GALL report.

In July 2017, the NRC issued "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," NUREG-2191 (ADAMS Accession Nos. ML17187A031 and ML17187A204), for applicants to use in preparing applications for subsequent license renewal. The GALL-SLR report provides AMPs that are sufficient for aging management for the subsequent period of extended operation (i.e., up to 80 years of operation), as required in § 54.21(a)(3). The NRC also issued "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants," (SRP-SLR), NUREG-2192 in July 2017 (ADAMS Accession No. ML17188A158). In a similar manner as the GALL report does, the GALL-SLR report, in Sections XI.M1, XI.S1, XI.S2, XI.M3, XI.11B, and XI.S3, describes the evaluation and technical bases for determining the sufficiency of ASME BPV Code Subsections IWB, IWC, IWD, IWE, IWF, or IWL for managing aging during the subsequent period of extended operation. Many other AMPs in the GALL-SLR report rely, in part but to a lesser degree, on the requirements specified in the ASME BPV Code, Section XI. The GALL-SLR report also indicates that the 1995 Edition through the 2013 Edition of the ASME BPV Code, Section XI, Subsections IWB, IWC, IWD, IWE, IWF, or IWL, as subject to the conditions in § 50.55a, are acceptable for complying with the requirements of § 54.21(a)(3), unless specifically noted in certain sections of the GALL-SLR report.

Evaluation with Respect to Aging Management

As part of this proposed rule, the NRC evaluated whether those AMPs in the GALL report and GALL-SLR report which rely upon Subsections IWB, IWC, IWD, IWE, IWF, or IWL of Section XI in the editions and addenda of the ASME BPV Code incorporated by reference into § 50.55a, in general continue to be acceptable if the AMP relies upon these Subsections in the 2015 Edition and the 2017 Edition. In general the NRC finds that the 2015 Edition and the 2017 Edition of Section XI of the ASME BPV Code, Subsections IWB, IWC, IWD, IWE, IWF, or IWL, as subject to the conditions of this proposed rule, are acceptable for the AMPs in the GALL report and GALL-SLR report and the conclusions of the GALL report and GALL-SLR report remain valid with the exception of augmentation, specifically noted in those reports. Accordingly, an applicant for license renewal (including subsequent license renewal) may use, in its plant-specific license renewal application, Subsections IWB, IWC, IWD, IWE, IWF, or IWL of Section XI of the 2015 Edition and the 2017 Edition of the ASME BPV Code, as subject to the conditions in this proposed rule, without additional justification. Similarly, a licensee approved for license renewal that relied on the AMPs may use Subsections IWB, IWC, IWD, IWE, IWF, or IWL of Section XI of the 2015 Edition and the 2017 Edition of the ASME BPV Code. However, applicants must assess and follow applicable NRC requirements with regard to licensing basis changes and evaluate the possible impact on the elements of existing AMPs.

Some of the AMPs in the GALL report and GALL-SLR report recommend augmentation of certain Code requirements in order to ensure adequate aging management for license renewal. The technical and regulatory aspects of the AMPs for which augmentations are recommended also apply if the 2015 Edition and the 2017 Edition of Section XI of the ASME BPV Code are used to meet the requirements of § 54.21(a)(3). The NRC staff evaluated the changes in the 2015 Edition and the 2017 Edition of Section XI of the ASME BPV Code to determine if the augmentations described in the GALL report and GALL-SLR report remain

necessary; the NRC staff's evaluation has concluded that the augmentations described in the GALL and GALL-SLR reports are necessary to ensure adequate aging management.

For example, GALL-SLR report AMP XI.S3, "ASME Section XI, Subsection IWF", recommends that volumetric examination consistent with that of ASME BPV Code, Section XI, Table IWB-2500-1, Examination Category B-G-1 should be performed to detect cracking for high strength structural bolting (actual measured yield strength greater than or equal to 150 kilopound per square inch (ksi)) in sizes greater than 1 inch nominal diameter. The GALL-SLR report also indicates that this volumetric examination may be waived with adequate plant-specific justification. This guidance for aging management in the GALL-SLR report is the augmentation of the visual examination specified in Subsection IWF of the 2015 Edition and the 2017 Edition of ASME BPV Code, Section XI.

A license renewal applicant may either augment its AMPs as described in the GALL report and GALL-SLR report (for operation up to 60 and 80 years respectively), or propose alternatives for the NRC to review as part of the applicant's plant-specific justification for its AMPs.

VI. Specific Request for Comment

The NRC is considering changes to § 50.55a(g)(6)(ii)(D) *Augmented ISI requirements*: *Reactor vessel head inspections.* As previously discussed in the document, the NRC proposes to add a new condition to address the use of the term "sister plants" for the examinations of RPV upper heads. The use of sister plants under ASME BPV Code Case N-729-6 would allow extension of the volumetric inspection of replaced RPV heads with resistant materials from the current 10-year inspection frequency to a period of up to 40 years. The NRC is proposing a condition to prohibit the use of the concept of sister plants. The NRC is evaluating both the

definition of sister plants and factors of improvement between the growth of PWSCC in alloys 600/82/182 and 690/52/152. It is unclear whether the current criteria for sister plants (i.e., same owner) are appropriate. The NRC also questions whether other criteria, such as environment, alloy heat, and number of sisters in a particular group, should be included in the definition. The NRC continues to review information on PWSCC growth rates and factors of improvement for alloy 690/52/152 and 600/82/182 as proposed in MRP-386. While the NRC has concluded that crack growth in alloy 690/52/152 is sufficiently slower than in alloy 600/82/182 to support an inspection interval of 20 years, work continues in assessing whether the data and analyses support a 40-year interval.

The NRC is interested in receiving public input that addresses whether there are reasonable changes to the definition of the term “sister plants” that would better identify heads with enough material similarities such that examination of one head can be representative of all others in the group.

VII. Plain Writing

The Plain Writing Act of 2010 (Pub. L. 111-274) requires Federal agencies to write documents in a clear, concise, and well-organized manner. The NRC has written this document to be consistent with the Plain Writing Act as well as the Presidential Memorandum, “Plain Language in Government Writing,” published June 10, 1998 (63 FR 31883). The NRC requests comment on this document with respect to the clarity and effectiveness of the language used.

VIII. Voluntary Consensus Standards

The National Technology Transfer and Advancement Act of 1995, Public Law 104-113 (NTTAA), and implementing guidance in U.S. Office of Management and Budget (OMB) Circular A-119 (February 10, 1998), requires that Federal agencies use technical standards that are developed or adopted by voluntary consensus standards bodies unless using such a standard is inconsistent with applicable law or is otherwise impractical. The NTTAA requires Federal agencies to use industry consensus standards to the extent practical; it does not require Federal agencies to endorse a standard in its entirety. Neither the NTTAA nor Circular A-119 prohibit an agency from adopting a voluntary consensus standard while taking exception to specific portions of the standard, if those provisions are deemed to be ''inconsistent with applicable law or otherwise impractical.'' Furthermore, taking specific exceptions furthers the Congressional intent of Federal reliance on voluntary consensus standards because it allows the adoption of substantial portions of consensus standards without the need to reject the standards in their entirety because of limited provisions that are not acceptable to the agency.

In this proposed rule, the NRC is continuing its existing practice of establishing requirements for the design, construction, operation, ISI (examination) and IST of nuclear power plants by approving the use of the latest editions and addenda of the ASME BPV and OM Codes (ASME Codes) in § 50.55a. The ASME Codes are voluntary consensus standards, developed by participants with broad and varied interests, in which all interested parties (including the NRC and licensees of nuclear power plants) participate. Therefore, the NRC's incorporation by reference of the ASME Codes is consistent with the overall objectives of the NTTAA and OMB Circular A-119.

As discussed in Section III of this document, this proposed rule would condition the use of certain provisions of the 2015 and 2017 Editions to the ASME BPV Code, Section III,

Division 1 and the ASME BPV Code, Section XI, Division 1, as well as the 2015 and 2017 Editions to the ASME OM Code. In addition, the NRC is proposing to not adopt ("excludes") certain provisions of the ASME Codes as discussed in this document, and in the regulatory and backfit analysis for this proposed rule. The NRC believes that this proposed rule complies with the NTTAA and OMB Circular A-119 despite these conditions and "exclusions."

If the NRC did not conditionally accept ASME editions, addenda, and code cases, the NRC would disapprove them entirely. The effect would be that licensees and applicants would submit a larger number of requests for the use of alternatives under § 50.55a(z), requests for relief under § 50.55a(f) and (g), or requests for exemptions under § 50.12 and/or § 52.7. These requests would likely include broad-scope requests for approval to issue the full scope of the ASME Code editions and addenda which would otherwise be approved as proposed in this proposed rule (i.e., the request would not be simply for approval of a specific ASME Code provision with conditions). These requests would be an unnecessary additional burden for both the licensee and the NRC, inasmuch as the NRC has already determined that the ASME Codes and Code Cases that are the subject of this proposed rule are acceptable for use (in some cases with conditions). For these reasons, the NRC concludes that this proposed rule's treatment of ASME Code editions and addenda, and code cases and any conditions placed on them does not conflict with any policy on agency use of consensus standards specified in OMB Circular A-119.

The NRC did not identify any other voluntary consensus standards developed by U.S. voluntary consensus standards bodies for use within the U.S. that the NRC could incorporate by reference instead of the ASME Codes. The NRC also did not identify any voluntary consensus standards developed by multinational voluntary consensus standards bodies for use on a multinational basis that the NRC could incorporate by reference instead of the ASME Codes. The NRC identified codes addressing the same subject as the ASME Codes for use in

individual countries. At least one country, Korea, directly translated the ASME Code for use in that country. In other countries (e.g., Japan), ASME Codes were the basis for development of the country's codes, but the ASME Codes were substantially modified to accommodate that country's regulatory system and reactor designs. Finally, there are countries (e.g., the Russian Federation) where that country's code was developed without regard to the ASME Code. However, some of these codes may not meet the definition of a voluntary consensus standard because they were developed by the state rather than a voluntary consensus standards body. Evaluation by the NRC of the countries' codes to determine whether each code provides a comparable or enhanced level of safety when compared against the level of safety provided under the ASME Codes would require a significant expenditure of agency resources. This expenditure does not seem justified, given that substituting another country's code for the U.S. voluntary consensus standard does not appear to substantially further the apparent underlying objectives of the NTTAA.

In summary, this proposed rule satisfies the requirements of the NTTAA and OMB Circular A-119.

IX. Incorporation by Reference—Reasonable Availability to Interested Parties

The NRC proposes to incorporate by reference four recent editions to the ASME Codes for nuclear power plants and two revised ASME Code Cases. As described in the "Background" and "Discussion" sections of this document, these materials contain standards for the design, fabrication, and inspection of nuclear power plant components. The NRC also proposes to incorporate by reference an EPRI Topical Report. As described in the "Background" and "Discussion" sections of this document, this report contains proposed requirements related to the two revised ASME Code Cases.

The NRC is required by law to obtain approval for incorporation by reference from the Office of the Federal Register (OFR). The OFR's requirements for incorporation by reference are set forth in 1 CFR part 51. On November 7, 2014, the OFR adopted changes to its regulations governing incorporation by reference (79 FR 66267). The OFR regulations require an agency to include in a proposed rule a discussion of the ways that the materials the agency proposes to incorporate by reference are reasonably available to interested parties or how it worked to make those materials reasonably available to interested parties. The discussion in this section complies with the requirement for proposed rules as set forth in § 51.5(a)(1).

The NRC considers "interested parties" to include all potential NRC stakeholders, not only the individuals and entities regulated or otherwise subject to the NRC's regulatory oversight. These NRC stakeholders are not a homogenous group but vary with respect to the considerations for determining reasonable availability. Therefore, the NRC distinguishes between different classes of interested parties for the purposes of determining whether the material is "reasonably available." The NRC considers the following to be classes of interested parties in NRC rulemakings with regard to the material to be incorporated by reference:

- Individuals and small entities regulated or otherwise subject to the NRC's regulatory oversight (this class also includes applicants and potential applicants for licenses and other NRC regulatory approvals) and who are subject to the material to be incorporated by reference by rulemaking. In this context, "small entities" has the same meaning as a "small entity" under § 2.810.

- Large entities otherwise subject to the NRC's regulatory oversight (this class also includes applicants and potential applicants for licenses and other NRC regulatory approvals) and who are subject to the material to be incorporated by reference by rulemaking. In this context, "large entities" are those which do not qualify as a "small entity" under § 2.810.

- Non-governmental organizations with institutional interests in the matters regulated by the NRC.
- Other Federal agencies, states, local governmental bodies (within the meaning of § 2.315(c)).
- Federally-recognized and State-recognized[4] Indian tribes.
- Members of the general public (i.e., individual, unaffiliated members of the public who are not regulated or otherwise subject to the NRC's regulatory oversight) who may wish to gain access to the materials which the NRC proposes to incorporate by reference by rulemaking in order to participate in the rulemaking process.

The NRC makes the materials to be incorporated by reference available for inspection to all interested parties, by appointment, at the NRC Technical Library, which is located at Two White Flint North, 11545 Rockville Pike, Rockville, Maryland 20852; telephone: 301-415-7000; email: Library.Resource@nrc.gov.

Interested parties may obtain a copy of the EPRI Topical Report free of charge from EPRI from their Web site at www.epri.com.

Interested parties may purchase a copy of the ASME materials from ASME at Three Park Avenue, New York, NY 10016, or at the ASME Web site https://www.asme.org/shop/standards. The materials are also accessible through third-party subscription services such as IHS (15 Inverness Way East, Englewood, CO 80112; https://global.ihs.com) and Thomson Reuters Techstreet (3916 Ranchero Dr, Ann Arbor, MI 48108; http://www.techstreet.com). The purchase prices for individual documents range from $225 to $720 and the cost to purchase all documents is approximately $9,000.

[4] State-recognized Indian tribes are not within the scope of § 2.315(c). However, for purposes of the NRC's compliance with 1 CFR 51.5, "interested parties" includes a broad set of stakeholders, including State-recognized Indian tribes.

For the class of interested parties constituting members of the general public who wish to gain access to the materials to be incorporated by reference in order to participate in the rulemaking, the NRC recognizes that the $9,000 cost may be so high that the materials could be regarded as not reasonably available for purposes of commenting on this rulemaking, despite the NRC's actions to make the materials available at the NRC's PDR. Accordingly, the NRC sent a letter to the ASME requesting that they consider enhancing public access to these materials during the public comment period (ADAMS Accession No. ML17310A186). In a May 30, 2018, email to the NRC, the ASME agreed to make the materials available online in a read-only electronic access format during the public comment period (ADAMS Accession No. ML18157A113). Therefore, the four editions to the ASME Codes for nuclear power plants, and the two ASME Code Cases which the NRC proposes to incorporate by reference in this rulemaking are available in read-only format at the ASME Web site http://go.asme.org/NRC.

The NRC concludes that the materials the NRC proposes to incorporate by reference in this proposed rule are reasonably available to all interested parties because the materials are available to all interested parties in multiple ways and in a manner consistent with their interest in the materials.

X. Environmental Assessment and Final Finding of No Significant Environmental Impact

This proposed rule action is in accordance with the NRC's policy to incorporate by reference in § 50.55a new editions and addenda of the ASME BPV and OM Codes to provide updated rules for constructing and inspecting components and testing pumps, valves, and dynamic restraints (snubbers) in light-water nuclear power plants. The ASME Codes are national voluntary consensus standards and are required by the NTTAA to be used by government agencies unless the use of such a standard is inconsistent with applicable law or otherwise impractical. The National Environmental Policy Act (NEPA) requires Federal

agencies to study the impacts of their ‘‘major Federal actions significantly affecting the quality of the human environment,’’ and prepare detailed statements on the environmental impacts of the proposed action and alternatives to the proposed action (42 U.S.C. 4332(C); NEPA Sec. 102(C)).

The NRC has determined under NEPA, as amended, and the NRC’s regulations in subpart A of 10 CFR part 51, that this proposed rule is not a major Federal action significantly affecting the quality of the human environment and, therefore, an environmental impact statement is not required. The rulemaking does not significantly increase the probability or consequences of accidents, no changes are being made in the types of effluents that may be released off-site, and there is no significant increase in public radiation exposure. The NRC concludes that the increase in occupational exposure would not be significant. This proposed rule does not involve non-radiological plant effluents and has no other environmental impact. Therefore, no significant non-radiological impacts are associated with this action. The determination of this environmental assessment is that there will be no significant off-site impact to the public from this action. Therefore, a finding of no significant impacts (FONSI) is appropriate.

XI. Paperwork Reduction Act Statement

This proposed rule contains new or amended collections of information subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq). This proposed rule has been submitted to the Office of Management and Budget for review and approval of the information collections.

Type of submission, new or revision: Revision.

The title of the information collection: Domestic Licensing of Production and Utilization Facilities: Incorporation by Reference of American Society of Mechanical Engineers Codes and Code Cases.

The form number if applicable: Not applicable.

How often the collection is required or requested: On occasion.

Who will be required or asked to respond: Power reactor licensees and applicants for power reactors under construction.

An estimate of the number of annual responses: -53.

The estimated number of annual respondents: 103.

An estimate of the total number of hours needed annually to comply with the information collection requirement or request: -12,640.

Abstract: This proposed rule is the latest in a series of rulemakings to amend the NRC's regulations to incorporate by reference revised and updated ASME Codes for nuclear power plants. The number of operating nuclear power plants has decreased and the NRC has increased its estimate of the burden associated with developing alternative requests. Overall, the reporting burden for § 50.55a has increased.

The U.S. Nuclear Regulatory Commission is seeking public comment on the potential impact of the information collections contained in this proposed rule and on the following issues:

1. Is the proposed information collection necessary for the proper performance of the functions of the NRC, including whether the information will have practical utility?

2. Is the estimate of the burden of the proposed information collection accurate?

3. Is there a way to enhance the quality, utility, and clarity of the information to be collected?

4. How can the burden of the proposed information collection on respondents be minimized, including the use of automated collection techniques or other forms of information technology?

A copy of the OMB clearance package and proposed rule is available in ADAMS (Accession Nos. ML18150A267 and ML18150A265) or may be viewed free of charge at the NRC's PDR, One White Flint North, 11555 Rockville Pike, Room O-1 F21, Rockville, MD 20852. You may obtain information and comment submissions related to the OMB clearance package by searching on http://www.regulations.gov under Docket ID NRC-2016-0082.

You may submit comments on any aspect of these proposed information collection(s), including suggestions for reducing the burden and on the previously stated issues, by the following methods:

- **Federal Rulemaking Web site**: Go to http://www.regulations.gov and search for Docket ID NRC-2016-0082.
- **Mail comments to**: Information Services Branch, Office of the Chief Information Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001 or to the OMB reviewer at: OMB Office of Information and Regulatory Affairs (3150-0011), Attn: Desk Officer for the Nuclear Regulatory Commission, 725 17th Street, NW Washington, DC 20503; e-mail: oira_submission@omb.eop.gov.

Submit comments by December 10, 2018. Comments received after this date will be considered if it is practical to do so, but the NRC staff is able to ensure consideration only for comments received on or before this date.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, a

collection of information unless the document requesting or requiring the collection displays a currently valid OMB control number.

XII. Regulatory Analysis

The NRC has prepared a draft regulatory analysis on this proposed rule. The analysis examines the costs and benefits of the alternatives considered by the Commission. The NRC requests public comments on the draft regulatory analysis, (ADAMS Accession No. ML18150A267). Comments on the draft analysis may be submitted to the NRC by any method provided in the **ADDRESSES** section of this document.

XIII. Backfitting and Issue Finality

Introduction

The NRC's Backfit Rule in § 50.109 states that the NRC shall require the backfitting of a facility only when it finds the action to be justified under specific standards stated in the rule. Section 50.109(a)(1) defines backfitting as the modification of or addition to systems, structures, components, or design of a facility; the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct, or operate a facility. Any of these modifications or additions may result from a new or amended provision in the NRC’s rules or the imposition of a regulatory position interpreting the NRC’s rules that is either new or different from a previously applicable NRC position after issuance of the construction permit or the operating license or the design approval.

Section 50.55a requires nuclear power plant licensees to:

- Construct ASME BPV Code Class 1, 2, and 3 components in accordance with the rules provided in Section III, Division 1, of the ASME BPV Code ("Section III").
- Inspect Class 1, 2, 3, Class MC, and Class CC components in accordance with the rules provided in Section XI, Division 1, of the ASME BPV Code ("Section XI").
- Test Class 1, 2, and 3 pumps, valves, and dynamic restraints (snubbers) in accordance with the rules provided in the ASME OM Code.

This rulemaking proposes to incorporate by reference the 2015 and 2017 Editions to the ASME BPV Code, Section III, Division 1 and ASME BPV Code, Section XI, Division 1, as well as the 2015 and 2017 Editions to the ASME OM Code.

The ASME BPV and OM Codes are national consensus standards developed by participants with broad and varied interests, in which all interested parties (including the NRC and utilities) participate. A consensus process involving a wide range of stakeholders is consistent with the NTTAA, inasmuch as the NRC has determined that there are sound regulatory reasons for establishing regulatory requirements for design, maintenance, ISI, and IST by rulemaking. The process also facilitates early stakeholder consideration of backfitting issues. Thus, the NRC believes that the NRC need not address backfitting with respect to the NRC's general practice of incorporating by reference updated ASME Codes.

Overall Backfitting Considerations: Section III of the ASME BPV Code

Incorporation by reference of more recent editions and addenda of Section III of the ASME BPV Code does not affect a plant that has received a construction permit or an operating license or a design that has been approved. This is because the edition and addenda to be used in constructing a plant are, under § 50.55a, determined based on the date of the construction permit, and are not changed thereafter, except voluntarily by the licensee.

The incorporation by reference of more recent editions and addenda of Section III ordinarily applies only to applicants after the effective date of the final rule incorporating these new editions and addenda. Thus, incorporation by reference of a more recent edition and addenda of Section III does not constitute "backfitting" as defined in § 50.109(a)(1).

Overall Backfitting Considerations: Section XI of the ASME BPV Code and the ASME OM Code

Incorporation by reference of more recent editions and addenda of Section XI of the ASME BPV Code and the ASME OM Code affects the ISI and IST programs of operating reactors. However, the Backfit Rule generally does not apply to incorporation by reference of later editions and addenda of the ASME BPV Code (Section XI) and OM Code. As previously mentioned, the NRC's longstanding regulatory practice has been to incorporate later versions of the ASME Codes into § 50.55a. Under § 50.55a, licensees shall revise their ISI and IST programs every 120 months to the latest edition and addenda of Section XI of the ASME BPV Code and the ASME OM Code incorporated by reference into § 50.55a 12 months before the start of a new 120-month ISI and IST interval. Thus, when the NRC approves and requires the use of a later version of the Code for ISI and IST, it is implementing this longstanding regulatory practice and requirement.

Other circumstances where the NRC does not apply the Backfit Rule to the approval and requirement to use later Code editions and addenda are as follows:

1. When the NRC takes exception to a later ASME BPV Code or OM Code provision but merely retains the current existing requirement, prohibits the use of the later Code provision, limits the use of the later Code provision, or supplements the provisions in a later Code. The Backfit Rule does not apply because the NRC is not imposing new requirements. However, the NRC explains any such exceptions to the Code in the Statement of

Considerations and regulatory analysis for the rule.

2. When an NRC exception relaxes an existing ASME BPV Code or OM Code provision but does not prohibit a licensee from using the existing Code provision. The Backfit Rule does not apply because the NRC is not imposing new requirements.

3. Modifications and limitations imposed during previous routine updates of § 50.55a have established a precedent for determining which modifications or limitations are backfits, or require a backfit analysis (e.g., final rule dated September 10, 2008 [73 FR 52731], and a correction dated October 2, 2008 [73 FR 57235]). The application of the backfit requirements to modifications and limitations in the current rule are consistent with the application of backfit requirements to modifications and limitations in previous rules.

The incorporation by reference and adoption of a requirement mandating the use of a later ASME BPV Code or OM Code may constitute backfitting in some circumstances. In these cases, the NRC would perform a backfit analysis or documented evaluation in accordance with § 50.109. These include the following:

1. When the NRC endorses a later provision of the ASME BPV Code or OM Code that takes a substantially different direction from the existing requirements, the action is treated as a backfit (e.g., 61 FR 41303; August 8, 1996).

2. When the NRC requires implementation of a later ASME BPV Code or OM Code provision on an expedited basis, the action is treated as a backfit. This applies when implementation is required sooner than it would be required if the NRC simply endorsed the Code without any expedited language (e.g., 64 FR 51370; September 22, 1999).

3. When the NRC takes an exception to an ASME BPV Code or OM Code provision and imposes a requirement that is substantially different from the existing requirement as well as substantially different from the later Code (e.g., 67 FR 60529; September 26, 2002).

Detailed Backfitting Discussion: Proposed Changes Beyond Those Necessary To Incorporate by Reference the New ASME BPV and OM Code Provisions

This section discusses the backfitting considerations for all the proposed changes to § 50.55a that go beyond the minimum changes necessary and required to adopt the new ASME Code Addenda into § 50.55a.

ASME BPV Code, Section III

1. Add § 50.55a(b)(1)(x) to require compliance with two new conditions related to visual examination of bolts studs and nuts. Visual examination is one of the processes for acceptance of the final product to ensure its structural integrity and its ability to perform its intended function. The 2015 Edition of the ASME Code contains requirements for visual inspection of these components, however, the 2017 Edition does not require these visual examinations to be performed in accordance with NX-5100 and NX-5500. Therefore, the NRC proposes to add two conditions to ensure adequate procedures remain and qualified personnel remain capable of determining the structural integrity of these components. Since the proposed conditions restore requirements that were removed from the latest edition of the ASME Code, the proposed conditions does not constitute a new or changed NRC position. Therefore, the revision of this condition is not a backfit

2. Add § 50.55a(b)(1)(xi) to require conditions on the use of ASME BPV Code, Section III, Appendix XXVI for installation of high density polyethylene (HDPE) pressure piping. This Appendix is new in the 2015 Edition of Section III, since it is the first time the ASME BPV Code has provided rules for the use of polyethylene piping. The use of HDPE is newly allowed by the Code, which provides alternatives to the use of current materials. Therefore, this proposed change is not a backfit.

3. Add § 50.55a(b)(1)(xii) to prohibit applicants and licensees from using a certifying

engineer in lieu of a registered professional engineer for code related activities that are applicable to U.S. nuclear facilities regulated by the NRC. In the 2017 Edition of ASME BPV Code, Section III, Subsection NCA, the several Subsections were updated to replace the term "registered professional engineer," with term "certifying engineer" to be consistent with ASME BPV Code Section III Mandatory Appendix XXIII.

The NRC reviewed these changes and has determined that the use of a certifying engineer in lieu of a registered professional engineer is only applicable for non-U.S. nuclear facilities. Since the use of a certifying engineer is newly allowed by the Code, the addition of the condition that prohibits the use of a certifying engineer in lieu of a registered professional engineer for code related activities is not a backfit.

ASME BPV Code, Section XI

1. Revise § 50.55a(b)(2)(ix) to require compliance with new condition § 50.55a(b)(2)(ix)(K). The NRC has developed proposed condition § 50.55a(b)(2)(ix)(K) to ensure containment leak-chase channel systems are properly inspected. This condition serves to clarify the NRC's existing expectations, as described in inspection reports and IN 2014-07, and will be applicable to all editions of the ASME Code, prior to the 2017 Edition. The NRC considers this condition a clarification of the existing expectations and, therefore, does not consider this condition a backfit.

As noted previously, after issuance of the IN, the NRC received feedback during an August 22, 2014, public meeting between NRC and ASME management (ADAMS Accession No. ML14245A003), noting that the IN guidance appeared to be in conflict with ASME Section XI Interpretation XI-1-13-10. In response to the comment during the public meeting, the NRC issued a letter to ASME (ADAMS Accession No. ML14261A051) which stated the NRC believes the IN is consistent with the requirements in the ASME Code and restated the existing

NRC staff position. ASME responded to the NRC's letter (ADAMS Accession No. ML15106A627) and noted that a condition in the regulations may be appropriate to clarify the NRC staff's position.

2. Revise § 50.55a(b)(2)(xx)(B) to clarify the condition with respect to the NRC's expectations for system leakage tests performed in lieu of a hydrostatic pressure test following repair/replacement activities performed by welding or brazing on a pressure retaining boundary using the 2003 Addenda through the latest edition and addenda of ASME BPV Code, Section XI incorporated by reference in paragraph § 50.55a(a)(1)(ii). This provision requires the licensee perform the applicable nondestructive testing that would be required by the 1992 Edition or later of ASME BPV Code, Section III. The nondestructive examination method (e.g. surface, volumetric, etc.) and acceptance criteria of the 1992 Edition or later of Section III shall be met and a system leakage test be performed in accordance with IWA-5211(a). The actual nondestructive examination and pressure testing may be performed using procedures and personnel meeting the requirements of the licensee's/applicant's current ISI code of record required by § 50.55a(g)(4). The proposed condition does not constitute a new or changed NRC position. Therefore, the revision of this condition is not a backfit

3. Add § 50.55a(b)(2)(xx)(C) to place two conditions on the use of the alternative BWR Class 1 system leakage test described in IWA-5213(b)(2), IWB-5210(c) and IWB-5221(d) of the 2017 Edition of ASME Section XI. This is a new pressure test allowed by the Code at a reduced pressure as an alternative to the pressure test currently required. This allows a reduction in the requirements which is consistent with several NRC-approved alternatives/relief requests. Therefore, this proposed change is not a backfit.

4. Add § 50.55a(b)(2)(xxi)(B) to require the plant-specific evaluation demonstrating the criteria of IWB-2500(f) are met be maintained in accordance with the Owners requirements, to prohibit use of the provisions of IWB-2500(f) and Table IWB-2500-1 Note 6 for of Examination

Category B-D Item Numbers B3.90 and B3.100 for plants with renewed licenses and to restrict the provisions of IWB-2500(g) and Table IWB-2500-1 Notes 6 and 7 for examination of Examination Category B-D Item Numbers B3.90 and B3.100 use to eliminate the preservice or inservice volumetric examination of plants with a Combined Operating License pursuant to 10 CFR part 52, or a plant that receives its operating license after October 22, 2015. This proposed revision applies the current requirements for use of these provisions as currently described in ASME Code Case N-702, which are currently allowed through Regulatory Guide 1.147, Revision 19. Therefore, the NRC does not consider the clarification to be a change in requirements. Therefore, this proposed change is not a backfit.

5. Revise the condition found in § 50.55a(b)(2)(xxv) to allow the use of IWA-4340 of Section XI, 2011 Addenda through 2017 Edition with conditions.

Add § 50.55a(b)(2)(xxv)(A) which will continue the prohibition of IWA-4340 for Section XI editions and addenda prior to the 2011 Addenda. This prohibition applies the current requirements for use of these provision, therefore, the NRC does not consider the addition of § 50.55a(b)(2)(xxv)(A) to be a change in requirements. Therefore, this proposed change is not a backfit.

Add § 50.55a(b)(2)(xxv)(B) which will allow the use of IWA-4340 of Section XI, 2011 Addenda through 2017 Edition with three conditions.

- The first proposed condition would prohibit the use of IWA-4340 on crack-like defects or those associated with flow accelerated corrosion.

  The design requirements and potentially the periodicity of followup inspections might not be adequate for crack-like defects that could propagate much faster than defects due to loss of material. Prior to the change to allow the use of IWA-4340, the provisions of this subsubarticle were not permitted for any type of defects. By establishment of the new conditions, the NRC proposes to allow the use of

IWA-4340 for defects such as wall loss due to general corrosion. Establishing a condition to not allow the use of IWA-4340 for crack-like defects does not constitute a new or changed NRC position. Therefore, the revision of this condition associated with crack-like defects is not a backfit.

As established in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report", Revision 2, effective management of flow accelerated corrosion entails: (a) an analysis to determine critical locations, (b) limited baseline inspections to determine the extent of thinning at these locations, (c) use of a predictive Code (e.g., CHECKWORKS); and (d) follow-up inspections to confirm the predictions, or repairing or replacing components as necessary. These provision are not included in IWA-4340. In addition, subparagraph IWA-4421(c)(2) provides provisions for restoring minimum required wall thickness by welding or brazing, which can be used to mitigate a defect associated with flow accelerated corrosion. The proposed condition related to flow accelerated corrosion does not constitute a new or changed NRC position. Therefore, the revision of this condition is not a backfit.

- The second proposed condition would require the design of a modification that mitigates a defect to incorporate a loss of material rate either 2 times the actual measured corrosion rate in that pipe location, or 4 times the estimated maximum corrosion rate for the piping system. This condition is consistent with Code Case N-789, "Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate- Energy Carbon Steel Piping, Section XI, Division 1," Section 3, "Design." The NRC has endorsed Code Case 789 in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." The proposed condition does not constitute a new or changed NRC position. Therefore, the revision of this condition is not a backfit.

- The third proposed condition would require the Owner to perform a wall thickness examination in the vicinity of the modification and relevant pipe base metal during each refueling outage cycle to detect propagation of the flaw unless the projected flaw propagation has been validated in two refueling outage cycles subsequent to the installation of the modification. This condition is consistent with Code Case N-789, Section 8, "Inservice Monitoring," which requires followup wall thickness measurements to verify that the minimum design thicknesses are maintained. The followup examination requirements in IWA-4340 are inconsistent with the NRC endorsement of Code Case 789 in Regulatory Guide 1.147 in that the inspections can be limited to demonstrating that the flaw has not propagated into material credited for structural integrity without validating the project flaw growth. The proposed condition does not constitute a new or changed NRC position. Therefore, the revision of this condition is not a backfit.

6. Revise § 50.55a(b)(2)(xxvi) to require that a system leakage test be conducted after implementing a repair replacement activity on a mechanical joint greater than NPS-1. The revision will also clarify what Code edition/addenda may be used when conducting the pressure test. This proposed revision clarifies the current requirements, which the NRC considers to be consistent with the meaning and intent of the current requirements. Therefore, the NRC does not consider the clarification to be a change in requirements. Therefore, this proposed change is not a backfit.

7. Revise § 50.55a(b)(2)(xxxii) to clarify the requirement to submit Summary Reports pre-2015 Edition and Owner Activity Reports in the 2015 Edition of the ASME BPV Code. This proposed revision clarifies the current requirements, which the NRC considers to be consistent with the meaning and intent of the current requirements. Therefore, the NRC does not

consider the clarification to be a change in requirements. Therefore, this proposed change is not a backfit.

8. Add § 50.55a(b)(2)(xxxv)(B) which would condition the use of 2015 Edition of ASME BPV Code, Section XI, Appendix A, paragraph A–4200(c), to define RT_{KIa} in equation (a) as $RT_{KIa} = T0 + 90.267 \exp(-0.003406T0)$ in lieu of the equation shown in the Code. When the equation was converted from SI units to U.S. Customary units a mistake was made which makes the equation erroneous. The equation shown above for RT_{KIa} is the correct formula. This is part of the newly revised Code, and the proposed addition of this condition is not a new requirement and therefore not a backfit.

9. Revise § 50.55a(b)(2)(xxxvi) to extend the applicability to use of the 2015 and 2017 Editions of Section XI of the ASME BPV Code. The condition was added in the 2009-2013 rulemaking and ASME did not make changes in the 2015 or 2017 Editions of the ASME BPV Code; therefore, the condition still applies but is not new to this proposed rule. The NRC considers this revision to the condition to be consistent with the meaning and intent of the current requirements. Therefore, the NRC does not consider the clarification to be a change in requirements. Therefore, this proposed change is not a backfit.

10. Add § 50.55a(b)(2)(xxxviii) to condition ASME BPV Code, Section XI, Appendix III, Supplement 2. Supplement 2 is closely-based on ASME Code Case N-824, which was incorporated by reference with conditions in § 50.55a(a)(3)(ii). The conditions on ASME BPV Code, Section XI, Appendix III, Supplement 2 are consistent with the conditions on ASME Code Case N-824. Therefore, the NRC does not consider this a new requirement. Therefore, this proposed change is not a backfit.

11. Add § 50.55a(b)(2)(xxxix) to condition the use of Section XI, IWA-4421(c)(1) and IWA-4421(c)(2). The NRC considers these conditions necessary as part of the allowance to use IWA-4340. The proposed condition on the use of IWA-4421(c)(1) and IWA-4421(c)(2)

does not constitute a new or changed NRC position. Therefore, the addition of this proposed condition is not a backfit.

12. Add § 50.55a(b)(2)(xl) to prohibit the use of ASME BPV Code, Section XI, Subparagraphs IWB-3510.4(b)(4) and IWB-3510.4(b)(5). The proposed condition does not change the current material requirements because the currently required testing to meet the material requirements for those materials addressed by the new condition would continue to be performed per the existing requirements. Therefore this condition on the use of IWB-3510.4(b) does not constitute a new or changed NRC position. Therefore, the addition of this proposed condition is not a backfit.

13. Add § 50.55a(b)(2)(xli) to prohibit the use of ASME BPV Code, Section XI, Subparagraphs IWB-3112(a)(3) and IWC-3112(a)(3) in the 2013 Edition of Section XI through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii). The proposed condition is consistent with the NRC's current prohibition of these items discussed in Regulatory Guide 1.193 in the discussion of ASME Code Case N-813. Therefore, this condition does not constitute a new or changed NRC position. Therefore, the addition of this proposed condition is not a backfit.

14. Add § 50.55a(b)(2)(xlii) to provide conditions for Examination Category B-F, Item B5.11 and Item B5.71 in the 2011a Addenda through the latest edition and addenda incorporated by reference in previous paragraphs (a)(1)(ii) of this section. The proposed conditions are consistent with the conditions on ASME Code Case N-799 in Regulatory Guide 1.147. Therefore, these conditions do not constitute a new or changed NRC position. Therefore, the addition of these proposed conditions is not a backfit.

15. Revise § 50.55a(g)(6)(ii)(D) to implement Code Case N-729-6. On March 3, 2016, the ASME approved the sixth revision of ASME BPV Code Case N-729, (N-729-6). The NRC proposes to update the requirements of § 50.55a(g)(6)(ii)(D) to require licensees to implement

ASME BPV Code Case N-729-6, with conditions. The ASME BPV Code Case N-729-6 contains similar requirements as N-729-4; however, N-729-6 also contains new requirements to address peening mitigation and inspection relief for replaced reactor pressure vessel heads with nozzles and welds made of more crack resistant materials. The new NRC conditions on the use of ASME BPV Code Case N-729-6 address operational experience, clarification of implementation, and the use of alternatives to the code case.

The current regulatory requirements for the examination of pressurized water reactor upper RPV heads that use nickel-alloy materials are provided in § 50.55a(g)(6)(ii)(D). This section was first created by rulemaking, dated September 10, 2008, (73 FR 52730) to require licensees to implement ASME BPV Code Case N-729-1, with conditions, instead of the examinations previously required by the ASME BPV Code, Section XI. The action did constitute a backfit; however, the NRC concluded that imposition of ASME BPV Code Case N-729-1, as conditioned, constituted an adequate protection backfit.

The General Design Criteria (GDC) for nuclear power plants (appendix A to 10 CFR part 50) or, as appropriate, similar requirements in the licensing basis for a reactor facility, provide bases and requirements for NRC assessment of the potential for, and consequences of, degradation of the reactor coolant pressure boundary (RCPB). The applicable GDC include GDC 14 (Reactor Coolant Pressure Boundary), GDC 31 (Fracture Prevention of Reactor Coolant Pressure Boundary), and GDC 32 (Inspection of Reactor Coolant Pressure Boundary). General Design Criterion 14 specifies that the RCPB be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture. General Design Criterion 31 specifies that the probability of rapidly propagating fracture of the RCPB be minimized. General Design Criterion 32 specifies that components that are part of the RCPB have the capability of being periodically inspected to assess their structural and leak tight integrity.

The NRC concludes that incorporation by reference of Code Case N-729-6, as conditioned, into § 50.55a as a mandatory requirement will continue to ensure reasonable assurance of adequate protection of public health and safety. Updating the regulations to require using ASME BPV Code Case N-729-6, with conditions, ensures that potential flaws will be detected before they challenge the structural or leak tight integrity of the reactor pressure vessel upper head within current nondestructive examination limitations. The code case provisions and the NRC's proposed conditions on examination requirements for reactor pressure vessel upper heads are essentially the same as those established under ASME BPV Code Case N-729-4, as conditioned. Exceptions include: 1) an introduction of examination relief for upper heads with Alloy 690 penetration nozzles to be examined volumetrically every 20 years in accordance with Table 1 of ASME BPV Code Case N-729-6, 2) introduction of peening as a mitigation technique along with requirements for peening and inspection relief following peening and 3) substitution of a volumetric leak path examination for a required surface examination if a bare metal visual examination identifies a possible indication of leakage.

The NRC continues to find that examinations of reactor pressure vessel upper heads, their penetration nozzles, and associated partial penetration welds are necessary for adequate protection of public health and safety and that the requirements of ASME BPV Code Case N 729-6, as conditioned, represent an acceptable approach, developed, in part, by a voluntary consensus standards organization for performing future inspections. The proposed NRC conditions on Code Case N-729-6 address newly defined provisions by the Code for peening and inspection relief for upper heads with Alloy 690 penetration nozzles which provide alternatives to the use of current requirements and provide clarification or relaxation of existing conditions. Therefore, the NRC concludes the proposed incorporation by reference of ASME BPV Code Case N-729-6, as conditioned, into § 50.55a is not a backfit.

16. Revise § 50.55a(g)(6)(ii)(F), "Examination requirements for Class 1 piping and nozzle dissimilar metal butt welds." On November 7, 2016, the ASME approved the fifth revision of ASME BPV Code Case N-770 (N-770-5). The NRC proposes to update the requirements of § 50.55a(g)(6)(ii)(F) to require licensees to implement ASME BPV Code Case N-770-5, with conditions. The ASME BPV Code Case N-770-5 contains similar baseline and ISI requirements for unmitigated nickel-alloy butt welds, and preservice and ISI requirements for mitigated butt welds as N-770-2. However, N-770-5 also contains new provisions which extend the inspection frequency for cold leg temperature dissimilar metal butt welds greater than 14-inches in diameter to once per interval not to exceed 13 years, define performance criteria and examinations for welds mitigated by peening, and criteria for inservice inspection requirements for excavate and weld repair PWSCC mitigations. Minor changes were also made to address editorial issues, to correct figures, or to add clarity. The NRC's proposed conditions on the use of ASME BPV Code Case N-770-5 have been modified to address the changes in the code case, clarify reporting requirements and address the implementation of peening and excavate and weld repair PWSCC mitigation techniques.

The current regulatory requirements for the examination of ASME Class 1 piping and nozzle dissimilar metal butt welds that use nickel-alloy materials are provided in § 50.55a(g)(6)(ii)(F). This section was first created by rulemaking, dated June 21, 2011 (76 FR 36232), to require licensees to implement ASME BPV Code Case N-770-1, with conditions. The NRC added § 50.55a(g)(6)(ii)(F) to require licensees to implement ASME BPV Code Case N-770-1, with conditions, instead of the examinations previously required by the ASME BPV Code, Section XI. The action did constitute a backfit; however, the NRC concluded that imposition of ASME BPV Code Case N-770-1, as conditioned, constituted an adequate protection backfit.

The GDC for nuclear power plants (appendix A to 10 CFR part 50) or, as appropriate, similar requirements in the licensing basis for a reactor facility, provide bases and requirements for NRC assessment of the potential for, and consequences of, degradation of the RCPB. The applicable GDC include GDC 14 (Reactor Coolant Pressure Boundary), GDC 31 (Fracture Prevention of Reactor Coolant Pressure Boundary) and GDC 32 (Inspection of Reactor Coolant Pressure Boundary). General Design Criterion 14 specifies that the RCPB be designed, fabricated, erected, and tested so as to have an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture. General Design Criterion 31 specifies that the probability of rapidly propagating fracture of the RCPB be minimized. General Design Criterion 32 specifies that components that are part of the RCPB have the capability of being periodically inspected to assess their structural and leak-tight integrity.

The NRC concludes that incorporation by reference of Code Case N-770-5, as conditioned, into § 50.55a as a mandatory requirement will continue to ensure reasonable assurance of adequate protection of public health and safety. Updating the regulations to require using ASME BPV Code Case N-770-5, with conditions, ensures leakage would likely not occur and potential flaws will be detected before they challenge the structural or leak-tight integrity of these reactor coolant pressure boundary piping welds. All current licensees of U.S. pressurized water reactors will be required to implement ASME BPV Code Case N-770-5, as conditioned. The Code Case N-770-5 provisions for the examination requirements for ASME Class 1 piping and nozzle nickel-alloy dissimilar metal butt welds are similar to those established under ASME BPV Code Case N-770-2, as conditioned, however, Code Case N-770-5 includes provisions for two additional PWSCC mitigation techniques peening and excavate and weld repair along with requirements for performance of these techniques and examination of welds mitigated using them. Additionally, Code Case N-770-5 would allow for

some relaxation in the re-examination or deferral of certain welds. However, the NRC's proposed condition would not allow this relaxation/deferral of examination requirements. The proposed NRC conditions on Code Case N-770-5 address newly defined provisions by the Code for examinations and performance criteria for mitigation by peening, examinations for mitigation by excavate and weld repair, and extension of the examination frequency for certain cold leg temperature welds which provide alternatives to the use of current requirements and provide clarification or relaxation of existing conditions. The proposed modification to the condition in § 50.55a(g)(6)(ii)(F)(11) adds an alternative method for meeting the condition. Therefore, the NRC concludes the proposed incorporation by reference of ASME BPV Code Case N-770-5, as conditioned, into § 50.55a is not a backfit.

ASME OM Code

1. Revise the introductory text of paragraph (b)(3) to reference the 1995 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in § 50.55a(a)(1)(iv), and to include Appendix IV of the ASME OM Code in the list of mandatory appendices incorporated by reference in § 50.55a. The revision of § 50.55a to incorporate by reference updated editions of the ASME OM Code is consistent with long-standing NRC policy and does not constitute a backfit.

2. Revise § 50.55a(b)(3)(ii) to specify that the condition on MOV testing applies to the latest edition and addenda of the ASME OM Code incorporated by reference in § 50.55a(a)(1)(iv). This will allow future rulemakings to revise § 50.55a(a)(1)(iv) to incorporate the latest edition of the ASME OM Code without the need to revise § 50.55a(b)(3)(ii). This is an administrative change to simplify future rulemakings and, therefore, is not a backfit.

3. Revise § 50.55a(b)(3)(iv) to 1) accept the use of Appendix II in the 2017 Edition of the ASME OM Code without conditions; 2) update § 50.55a(b)(3)(iv) to apply Table II to

Appendix II of the ASME OM Code, 2003 Addenda through the 2015 Edition; and 3) remove the outdated conditions in paragraphs (A) through (D) of § 50.55a(b)(3)(iv). These changes reflect improvements to Appendix II in the 2017 Edition of the ASME OM Code, and the removal of outdated conditions on previous editions and addenda of the ASME OM Code. The relaxation of conditions in § 50.55a(b)(3)(iv) to reflect the updated ASME OM Code is not a backfit.

4. Revise § 50.55a(b)(3)(viii) to specify that the condition on Subsection ISTE applies to the latest edition and addenda of the ASME OM Code incorporated by reference in § 50.55a(a)(1)(iv). This will allow future rulemakings to revise § 50.55a(a)(1)(iv) to incorporate the latest edition of the ASME OM Code without the need to revise § 50.55a(b)(3)(viii). This is an administrative change to simplify future rulemakings and, therefore, is not a backfit.

5. Revise § 50.55a(b)(3)(ix) to specify that Subsection ISTF of the ASME OM Code, 2017 Edition, is acceptable without conditions, and that licensees applying Subsection ISTF in the 2015 Edition of the ASME OM Code shall satisfy the requirements of Appendix V of the ASME OM Code. Subsection ISTF in the 2017 Edition of the ASME OM Code has incorporated the provisions from Appendix V such that its reference to Subsection ISTF in the 2017 Edition of the ASME OM Code is not necessary. This is an update to the condition to apply to the 2015 Edition (in addition to the 2012 Edition), and a relaxation to remove the applicability of the condition to the 2017 Edition of the ASME OM Code. Therefore, the update to this condition is not a backfit.

6. Revise § 50.55a(b)(3)(xi) for the implementation of paragraph ISTC-3700 on valve position indication in the ASME OM Code to apply to the 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in § 50.55a(a)(1)(iv). This will allow future rulemakings to revise § 50.55a(a)(1)(iv) to incorporate the latest edition of the ASME OM Code without the need to revise § 50.55a(b)(3)(xi). In addition, the NRC proposes

to clarify that this condition applies to all valves with remote position indicators within the scope of Subsection ISTC and all mandatory appendices. This is an administrative change to simplify future rulemakings and clarify the condition and, therefore, is not a backfit.

7. Establish § 50.55a(b)(3)(xii) to require the application of the AOV provisions in Appendix IV of the 2017 Edition of the ASME OM Code, when implementing the ASME OM Code, 2015 Edition. This will provide consistency between the implementation of these two new editions of the ASME OM Code and, therefore, this condition is not a backfit.

8. Revise § 50.55a(f)(4)(i) and (ii) to relax the time schedule for complying with the latest edition and addenda of the ASME OM Code for the initial and successive IST programs from 12 months to 18 months. This relaxation of the time schedule for the IST programs is not a backfit.

9. Add § 50.55a(f)(7), "Inservice Testing Reporting Requirements," to state that IST Plans and interim IST Plan updates for pumps and valves; and IST Plans and interim Plan updates related to snubber examination and testing must be submitted to the NRC. This requirement is currently in the ASME OM Code, but the ASME is planning to remove this from the ASME OM Code in the future. Therefore, this is not a backfit because the NRC is not imposing a new requirement.

10. Revise § 50.55a(g)(4)(i) and (ii) to relax the time schedule for complying with the latest edition and addenda of the ASME BPV Code for the initial and successive ISI programs from 12 months to 18 months. This relaxation of the time schedule for the ISI programs is not a backfit.

Conclusion

The NRC finds that incorporation by reference into § 50.55a of the 2015 and 2017 Editions of Section III, Division 1, of the ASME BPV Code subject to the identified conditions;

the 2015 and 2017 Edition of Section XI, Division 1, of the ASME BPV Code, subject to the identified conditions; the 2015 and 2017 Editions of the ASME OM Code subject to the identified conditions, and the two Code Cases N-729-6 and N-770-5 subject to identified conditions does not constitute backfitting or represent an inconsistency with any issue finality provisions in 10 CFR part 52.

XIV. Regulatory Flexibility Certification

Under the Regulatory Flexibility Act of 1980 (5 U.S.C. 605(b)), the NRC certifies that this proposed rule does not impose a significant economical impact on a substantial number of small entities. This proposed rule affects only the licensing and operation of commercial nuclear power plants. A licensee who is a subsidiary of a large entity does not qualify as a small entity. The companies that own these plants are not "small entities" as defined in the Regulatory Flexibility Act or the size standards established by the NRC (§ 2.810), as the companies:

- Provide services that are not engaged in manufacturing, and have average gross receipts of more than $6.5 million over their last 3 completed fiscal years, and have more than 500 employees;
- Are not governments of a city, county, town, township or village;
- Are not school districts or special districts with populations of less than 50; and
- Are not small educational institutions.

XV. Availability of Documents

The NRC is making the documents identified in Table 1 available to interested persons through one or more of the following methods, as indicated. To access documents related to this action, see the ADDRESSES section of this document.

Table 1 – Availability of Documents

Document	ADAMS Accession No.
Proposed Rule Documents	
Regulatory Analysis (includes backfitting discussion in Appendix A)	ML18150A267
Related Documents	
Letter from Brian Thomas, NRC, to William Berger, ASME; "Public Access to Material the NRC Seeks to Incorporate by Reference into its Regulations-Revised Request;" January 8, 2018	ML17310A186
Email from Christian Sanna, ASME, to Brian Thomas, NRC; May 30, 2018	ML18157A113
Memorandum from Wallace Norris, NRC, to David Rudland, NRC; "Summary of August 22, 2014, Public Meeting Between ASME and NRC - Information Exchange;" September 8, 2014	ML14245A003
Letter from John Lubinski, NRC, to Kevin Ennis, ASME; "NRC Information Notice 2014-07 Regarding Inspection of Containment Leak-Chase Channels;" March 3, 2015	ML14261A051
Letter from Ralph Hill, ASME, to John Lubinski, NRC; "ASME Code, Section XI Actions to Address Requirements for Examination of Containment Leak-Chase Channels;" April 13, 2015	ML15106A627
NUREG/CR-6654, "A Study of Air-Operated Valves in U.S. Nuclear Power Plants," February 2000	ML003691872
NRC Generic Letter 88-14, "Instrument Air Supply System Problems Affecting Safety-Related Equipment," August 1988	ML031130440
NRC Regulatory Issue Summary 2000-03, "Resolution of Generic Safety Issue (GSI) 158, 'Performance of Safety Related Power-Operated Valves Under Design-Basis Conditions'," March 2000	ML003686003
NRC Information Notice 1986-050, "Inadequate Testing To Detect Failures of Safety-Related Pneumatic Components or Systems;" June 1986	ML031220684
NRC Information Notice 1985-084, "Inadequate Inservice Testing of Main Steam Isolation Valves," October 1985	ML031180213

NRC Information Notice 1996-048, “Motor-Operated Valve Performance Issues,” August 1996	ML031060093
NRC Information Notice 1996-048, Supplement 1, “Motor-Operated Valve Performance Issues,” July 1998	ML031050431
NRC Information Notice 1998-13, ‘‘Post-Refueling Outage Reactor Pressure Vessel Leakage Testing Before Core Criticality,’’ April 1998.	ML031050237
NRC Information Notice 2014-07, “Degradation of Leak-Chase Channel Systems For Floor Welds Of Metal Containment Shell And Concrete Containment Metallic Liner,” May 2014	ML14070A114
NRC Information Notice 2015-13, “Main Steam Isolation Valve Failure Events,” December 2015	ML15252A122
NRC Inspection Report 50–254/97027, March 1998	ML15216A276
NUREG-0800, Section 5.4.2.2, Revision 1, “Steam Generator Tube Inservice Inspection,” July 1981	ML052340627
NUREG-0800, Section 5.4.2.2, Revision 2, “Steam Generator Program,” March 2007	ML070380194
NRC Regulatory Guide 1.83, Revision 1, “Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes,” July 1975 (withdrawn in 2009)	ML003740256
RG 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1,” Revision 19.	ML18114A225
NUREG/CR-7153, “Expanded Materials Degradation Assessment (EMDA),” October 2014	ML14279A321 ML14279A461 ML14279A349 ML14279A430 ML14279A331
NUREG-0619, Rev. 1, “BWR Feedwater Nozzle and Control Rod Drive Return Line Nozzle Cracking: Resolution of Generic Technical Activity A-10 (Technical Report),” November 1980	ML031600712
NUREG-1801, Rev 2, “Generic Aging Lessons Learned (GALL) Report,” December 2010	ML103490041
NUREG-1800, Rev. 2, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants,” December 2010	ML103490036
NUREG-2191, “Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report,” July 2017	ML17187A031 ML17187A204
NUREG-1950, “Disposition of Public Comments and Technical Bases for Changes in the License Renewal Guidance Documents NUREG-1801 and NUREG-1800,” April 2011	ML11116A062
NUREG/CR-6933, “Assessment of Crack Detection in Heavy-Walled Cast Stainless Steel Piping Welds Using Advanced Low-Frequency Ultrasonic Methods,” March 2007	ML071020410 ML071020414
NUREG/CR-7122, “An Evaluation of Ultrasonic Phased Array Testing for Cast Austenitic Stainless Steel Pressurizer Surge Line Piping Welds,” March 2012	ML12087A004
NUREG-2192, “Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants,” July	ML17188A158

2017	
Gupta KK, Hoffmann CL, Hamilton AM, DeLose F. Fracture Toughness of Pressure Boundary Steels With Higher Yield Strength. ASME. ASME Pressure Vessels and Piping Conference, *ASME 2010 Pressure Vessels and Piping Conference: Volume 7* ():45-58. doi:10.1115/PVP2010-25214	http://proceedings.asmedigitalcollection.asme.org/proceeding.aspx?articleid=1619041
ASME Codes, Standards, and Code Cases	
ASME BPV Code, Section III, Division 1: 2015 Edition and 2017 Edition	http://go.asme.org/NRC-ASME
ASME BPV Code, Section XI, Division 1: 2011a Addenda, 2013 Edition, 2015 Edition, and 2017 Edition	http://go.asme.org/NRC-ASME
ASME OM Code, Division 1: 2015 Edition and 2017 Edition	http://go.asme.org/NRC-ASME
ASME BPV Code Case N-729-6	http://go.asme.org/NRC-ASME
ASME BPV Code Case N-770-5	http://go.asme.org/NRC-ASME
EPRI Topical Report	
EPRI Topical Report, " Materials Reliability Program: Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement (MRP-335, Revision 3-A)," November 2016	https://www.epri.com/#/pages/product/000000003002009241/?lang=en

Throughout the development of this rulemaking, the NRC may post documents related to this proposed rule, including public comments, on the Federal rulemaking Web site at http://www.regulations.gov under Docket ID NRC-2016-0062. The Federal rulemaking Web site allows you to receive alerts when changes or additions occur in a docket folder. To subscribe: 1) Navigate to the docket folder for NRC-2011-0088; 2) click the "Sign up for Email Alerts" link; and 3) enter your email address and select how frequently you would like to receive emails (daily, weekly, or monthly).

List of Subjects in 10 CFR Part 50

Administrative practice and procedure, Antitrust, Backfitting, Classified information, Criminal penalties, Education, Fire prevention, Fire protection, Incorporation by reference,

Intergovernmental relations, Nuclear power plants and reactors, Penalties, Radiation protection, Reactor siting criteria, Reporting and recordkeeping requirements, Whistleblowing.

For the reasons set forth in the preamble, and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and 5 U.S.C. 553, the NRC proposes to adopt the following amendments to 10 CFR part 50:

PART 50 -- DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES

1. The authority citation for part 50 continues to read as follows:

Authority: Atomic Energy Act of 1954, secs. 11, 101, 102, 103, 104, 105, 108, 122, 147, 149, 161, 181, 182, 183, 184, 185, 186, 187, 189, 223, 234 (42 U.S.C. 2014, 2131, 2132, 2133, 2134, 2135, 2138, 2152, 2167, 2169, 2201, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2239, 2273, 2282); Energy Reorganization Act of 1974, secs. 201, 202, 206, 211 (42 U.S.C. 5841, 5842, 5846, 5851); Nuclear Waste Policy Act of 1982, sec. 306 (42 U.S.C. 10226); National Environmental Policy Act of 1969 (42 U.S.C. 4332); 44 U.S.C. 3504 note; Sec. 109, Public Law 96-295, 94 Stat. 783.

2. In § 50.55a:

a. In paragraph (a)(1)(i), remove the phrase “(referred to herein as ASME BPV Code)”;

b. In paragraph (a)(1)(i)(E)(*16*), remove the word “and”;

c. In paragraph (a)(1)(i)(E)(*17*), at the end of the sentence, remove the punctuation “.” and add in its place the punctuation “,”;

d. Add paragraphs (a)(1)(i)(E)(*18*) and (*19*);

e. In paragraph (a)(1)(ii), remove the acronym “BPV Code” and add in its place the words “Boiler and Pressure Vessel Code”;

f. Revise paragraphs (a)(1)(ii)(C)(*52*) and (*53*);

g. Add paragraphs (a)(1)(ii)(C)(*54*) and (*55*);

h. Revise paragraphs (a)(1)(iii)(C) and (D);

i. In paragraph (a)(1)(iv), remove the phrase “(various edition titles referred to herein as ASME OM Code)”;

j. In paragraph (a)(1)(iv)(C)(*1*), at the end of the sentence, remove the punctuation “.” and add in its place the punctuation “,”;

k. Add paragraphs (a)(1)(iv)(C)(*2*) and (*3*), and paragraph (a)(4);

l. In paragraph (b)(1), remove the number “2013” and add in its place the number “2017”;

m. In paragraph (b)(1)(ii), in Table I, remove the number “2013” in the last entry in the first column and add in its place the number “2017”, and remove the word “Note” wherever it appears in the second column and add in its place the word “Footnote”;

n. In paragraph (b)(1)(iii), remove the phrase “2008 Addenda” wherever it appears and add in its place the phrase “2017 Edition”;

o. In paragraph (b)(1)(v), remove the phrase “the latest edition and addenda” and add in its place the phrase “2009b Addenda of the 2007 Edition, where the NQA-1-1994 Edition is”;

p. In paragraph (b)(1)(vi), remove the phrase “the latest edition and addenda” and add in its place the phrase “all editions and addenda up to and including the 2013 Edition”;

q. In paragraph (b)(1)(vii), remove the phrase “the 2013 Edition” and add in its place the phrase “all editions and addenda up to and including the 2017 Edition”;

r. Add paragraphs (b)(1)(x) through (xii);

s. In paragraph (b)(2), remove the number “2013” and add in its place the number “2017”;

t. Remove and reserve paragraphs (b)(2)(vi), (vii), and (xvii);

u. Revise paragraph (b)(2)(ix) introductory text;

v. Add paragraph (b)(2)(ix)(K);

w. In paragraph (b)(2)(xviii)(D), remove the phrase “and 2013 Edition of Section XI of the ASME BPV Code” and add in its place the phrase “through the latest edition incorporated by reference in paragraph (a)(1)(ii) of this section”;

x. Revise paragraph (b)(2)(xx)(B) and add paragraph (b)(2)(xx)(C);

y. Remove and reserve paragraph (b)(2)(xxi)(A), and add paragraph (b)(2)(xxi)(B);

z. Revise paragraphs (b)(2)(xxv), (xxvi), (xxxii) and (xxxiv) introductory text;

aa. In paragraph (b)(2)(xxxiv)(B) add the phrase “of the 2013 and the 2015 Editions” after the phrase “Appendix U”;

bb. Revise paragraph (xxxv);

cc. In paragraph (b)(2)(xxxvi), remove the word “Edition” and add in its place the phrase “through 2017 Editions”;

dd. Add paragraphs (b)(2)(xxxviii) through (xlii);

ee. In paragraph (b)(3) introductory text, add the Roman numeral “IV” in sequential order, remove the phrase “2012 Edition, as specified” and add in its place the phrase “latest edition and addenda of the ASME OM Code incorporated by reference” and revise the last sentence in the paragraph;

ff. In paragraph (b)(3)(ii), remove the phrase “, 2011 Addenda, and 2012 Edition” and add in its place the phrase “through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section”;

gg. Revise paragraph (b)(3)(iv) introductory text and remove and reserve paragraphs (b)(3)(iv)(A) through (D);

hh. In paragraph (b)(3)(viii), remove the phrase “, 2011 Addenda, and 2012 Edition” and add in its place the phrase “through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section”;

ii. Revise paragraphs (b)(3)(ix) and (xi);

jj. Add paragraph (b)(3)(xii);

kk. In paragraphs (f)(4)(i) and (ii), remove the number “12” wherever it appears and add in its place the number “18”;

ll. Add paragraph (f)(7);

mm. In paragraph (g)(4) introductory text, remove the phrase “, subject to the condition listed in paragraph (b)(2)(vi) of this section”;

nn. In paragraph (g)(4)(i), remove the number “12” wherever it appears and add in its place the number “18”;

oo. In paragraph (g)(4)(ii), in the first sentence remove the number “12” and add in its place the number “18”; remove the date “August 17, 2017” wherever it appears and add in its place “**[DATE 75 DAYS AFTER EFFECTIVE DATE OF FINAL RULE]**”;

pp. Remove and reserve paragraph (g)(6)(ii)(C);

qq. Revise paragraphs (g)(6)(ii)(D)(*1*), (*2*) and (*4*), and add paragraphs (g)(6)(ii)(D)(5) through (8);

rr. Revise paragraphs (g)(6)(ii)(F)(*1*) and (*2*), and remove and reserve paragraph (g)(6)(ii)(F)(*3*);

ss. Revise paragraphs (g)(6)(ii)(F)(*4*), (*6*), (*9*) through (11), and (*13*), and add paragraphs (g)(6)(ii)(F)(*14*) through (*16*).

The revisions and additions read as follows:

§ 50.55a Codes and standards.

(a) * * *

(1) * * *

(i) * * *

(E) * * *

(*18*) 2015 Edition (including Subsection NCA; and Division 1 subsections NB through NH and Appendices), and

(*19*) 2017 Edition (including Subsection NCA; and Division 1 subsections NB through NG and Appendices).

* * * * *

(ii) * * *

(C) * * *

(*52*) 2011a Addenda,

(*53*) 2013 Edition,

(*54*) 2015 Edition, and

(*55*) 2017 Edition.

* * * * *

(iii) * * *

(C) *ASME BPV Code Case N-729-6.* ASME BPV Code Case N-729-6, “Alternative Examination Requirements for PWR Reactor Vessel Upper Heads With Nozzles Having Pressure-Retaining Partial-Penetration Welds Section XI, Division 1” (Approval Date: March 3, 2016), with the conditions in paragraph (g)(6)(ii)(D) of this section.

(D) *ASME BPV Code Case N-770-5.* ASME BPV Code Case N-770-5, “Alternative Examination Requirements and Acceptance Standards for Class 1 PWR Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities Section XI, Division 1” (Approval Date: November 7, 2016), with the conditions in paragraph (g)(6)(ii)(F) of this section.

* * * * *

(iv) * * *

(C) * * *

(*2*) 2015 Edition, and

(*3*) 2017 Edition.

* * * * *

(4) Electric Power Research Institute, Materials Reliability Program, 3420 Hillview Avenue, Palo Alto, CA 94304-1338; telephone: 1-650-855-2000; http://www.epri.com.

(i) “Materials Reliability Program: Topical Report for Primary Water Stress Corrosion Cracking Mitigation by Surface Stress Improvement (MRP-335, Revision 3-A)”, EPRI approval date: November 2016.

(ii) [Reserved]

* * * * *

(b) * * *

(1) * * *

(x) S*ection III Condition: Visual examination of bolts, studs and nuts.* Applicants or licensees applying the provisions of NB-2582, NC-2582, ND-2582, NE-2582, NF-2582, NG-2582 in the 2017 Edition of Section III, must apply paragraphs (b)(1)(x)(A) through (B) of this section.

(A) *Visual examination of bolts, studs, and nuts: First provision*. When applying the provisions of NB-2582, NC-2582, ND-2582, NE-2582, NF-2582, NG-2582 in the 2017 Edition of Section III, the visual examinations are required to be performed in accordance with procedures qualified to NB-5100, NC-5100, ND-5100, NE-5100, NF-5100, NG-5100 and performed by personnel qualified in accordance with NB-5500, NC-5500, ND-5500, NE-5500, NF-5500, and NG-5500.

(B) Visual examination of bolts, studs, and nuts: Second provision. When applying the provisions of NB-2582, NC-2582, ND-2582, NE-2582, NF-2582, NG-2582 in the 2017 Edition of Section III, the acceptance criteria from NB-2582, NC-2582, ND-2582, NE-2582, NF-2582,

NG-2582 in the 2015 Edition of Section III shall be used.

(xi) *Section III condition: Mandatory Appendix XXVI*. When applying the 2015 and 2017 Editions of Section III, Mandatory Appendix XXVI, "Rules for Construction of Class 3 Buried Polyethylene Pressure Piping," applicants or licensees must meet the following conditions:

(A) *Mandatory Appendix XXVI: First provision.* When performing fusing procedure qualification tests and operator performance qualification tests in accordance with XXVI-4330 and XXVI-4340 the following essential variables shall be used for the performance qualification tests of butt fusion joints:

(*1*) Joint Type: A change in the type of joint from that qualified, except that a square butt joint qualifies as a mitered joint.

(*2*) Pipe Surface Alignment: A change in the pipe outside diameter (O.D.) surface misalignment of more than 10 percent of the wall thickness of the thinner member to be fused.

(*3*) PE Material: Each lot of polyethylene source material to be used in production (XXVI-2310(c)).

(*4*) Wall Thickness: Each thickness to be fused in production (XXVI-2310(c)).

(*5*) Diameter: Each diameter to be fused in production (XXVI-2310(c)).

(*6*) Cross-sectional Area: Each combination of thickness and diameter (XXVI-2310(c)).

(*7*) Position: Maximum machine carriage slope when greater than 20 degrees from horizontal (XXVI-4321(c)).

(*8*) Heater Surface Temperature: A change in the heater surface temperature to a value beyond the range tested (XXVI-2321).

(*9*) Ambient Temperature: A change in ambient temperature to less than 50^0F (10^0C) or greater than 125^0F (52^0C) (XXVI-4412(b)).

(*10*) Interfacial Pressure: A change in interfacial pressure to a value beyond the range tested (XXVI-2321).

(*11*) Decrease in Melt Bead Width: A decrease in melt bead size from that qualified.

(*12*) Increase in Heater Removal Time: An increase in heater plate removal time from that qualified.

(*13*) Decrease in Cool-down Time: A decrease in the cooling time at pressure from that qualified.

(*14*) Fusing Machine Carriage Model: A change in the fusing machine carriage model from that tested (XXVI-2310(d)).

(B) *Mandatory Appendix XXVI: Second provision.* When performing qualification tests of butt fusion joints in accordance with XXVI-4342,both the bend test and the high speed tensile impact test shall be successfully completed.

(C) *Mandatory Appendix XXVI: Third provision*. When performing fusing procedure qualification tests and operator performance qualification tests in accordance with 2017 Edition of BPV Code Section III XXVI-4330 and XXVI-4340, the following essential variables shall be used for the performance qualification tests of electrofusion joints:

(*1*) Joint Design: A change in the design of an electrofusion joint.

(*2*) Fit-up Gap: An increase in the maximum radial fit-up gap qualified.

(*3*) Pipe PE Material: A change in the PE designation or cell classification of the pipe from that tested (XXVI-2322(a)).

(*4*) Fitting PE Material: A change in the manufacturing facility or production lot from that tested (XXVI-2322(b)).

(*5*) Pipe Wall Thickness: Each thickness to be fused in production (XXVI-2310(c)).

(*6*) Fitting Manufacturer: A change in fitting manufacturer.

(*7*) Pipe Diameter: Each diameter to be fused in production (XXVI-2310(c)).

(*8*) Cool-down Time: A decrease in the cool time at pressure from that qualified.

(*9*) Fusion Voltage: A change in fusion voltage.

(*10*) Nominal Fusion Time: A change in the nominal fusion time.

(*11*) Material Temperature Range: A change in material fusing temperature beyond the range qualified.

(*12*) Power Supply: A change in the make or model of electrofusion control box (XXVI-2310(f)).

(*13*) Power Cord: A change in power cord material, length, or diameter that reduces current at the coil to below the minimum qualified.

(*14*) Processor: A change in the manufacturer or model number of the processor. (XXVI-2310(f)).

(*15*) Saddle Clamp: A change in the type of saddle clamp.

(*16*) Scraping Device: A change from a clean peeling scraping tool to any other type of tool.

(D) *Mandatory Appendix XXVI: Fourth provision.* Performance of crush tests in

accordance with 2017 BPV Code Section III XXVI-2332(a) and XXVI-2332(b) and electrofusion bend tests in accordance with 2017 BPV Code Section III XXVI-2332(b) are required to qualify fusing procedures for electrofusion joints in polyethylene piping installed in accordance with 2017 Edition of ASME BPV Code Section III, Mandatory Appendix XXVI.

(E) *Mandatory Appendix XXVI: Fifth provision*. Electrofusion saddle fittings and electrofusion saddle joints are not permitted for use. Only full 360-degree seamless sleeve electrofusion couplings and full 360-degree electrofusion socket joints are permitted.

(xii) *Section III condition: Certifying Engineer.* When applying the 2017 and later editions of ASME BPV Code Section III, the NRC does not permit applicants and licensees to use a certifying engineer in lieu of a registered professional engineer for Code-related activities that are applicable to U.S. nuclear facilities regulated by the NRC.

(2) * * *

(ix) *Section XI condition: Metal containment examinations*. Applicants or licensees applying Subsection IWE, 1992 Edition with the 1992 Addenda, or the 1995 Edition with the 1996 Addenda, must satisfy the requirements of paragraphs (b)(2)(ix)(A) through (E) and (b)(2)(ix)(K) of this section. Applicants or licensees applying Subsection IWE, 1998 Edition through the 2001 Edition with the 2003 Addenda, must satisfy the requirements of paragraphs (b)(2)(ix)(A) and (B) and (b)(2)(ix)(F) through (I) and (b)(2)(ix)(K) of this section. Applicants or licensees applying Subsection IWE, 2004 Edition, up to and including the 2005 Addenda, must satisfy the requirements of paragraphs (b)(2)(ix)(A) and (B) and (b)(2)(ix)(F) through (H) and (b)(2)(ix)(K) of this section. Applicants or licensees applying Subsection IWE, 2004 Edition with the 2006 Addenda, must satisfy the requirements of paragraphs (b)(2)(ix)(A)(2) and (b)(2)(ix)(B) and (b)(2)(ix)(K) of this section. Applicants or licensees applying Subsection IWE, 2007 Edition through the 2015 Edition, must satisfy the requirements of paragraphs (b)(2)(ix)(A)(2) and (b)(2)(ix)(B) and (J) and (K) of this section. Applicants or licensees applying

Subsection IWE, 2017 Edition, must satisfy the requirements of paragraphs (b)(2)(ix)(A)(2) and (b)(2)(ix)(B) and (J) of this section.

* * * * *

(K) *Metal Containment Examinations: Eleventh provision*. A general visual examination of containment leak chase channel moisture barriers must be performed once each interval, in accordance with the completion percentages in Table IWE 2411 1 of the 2017 Edition. Examination shall include the moisture barrier materials (caulking, gaskets, coatings, etc.) that prevent water from accessing the embedded containment liner within the leak chase channel system. Caps of stub tubes extending above the concrete floor interface may be inspected, provided the configuration of the cap functions as a moisture barrier as described previously. Leak chase channel system closures need not be disassembled for performance of examinations if the moisture barrier material is clearly visible without disassembly, or coatings are intact. The closures are acceptable if no damage or degradation exists that would allow intrusion of moisture against inaccessible surfaces of the metal containment shell or liner within the leak chase channel system. Examinations that identify flaws or relevant conditions shall be extended in accordance with paragraph IWE 2430 of the 2017 Edition.

(xx) * * *

(B) *System leakage tests: Second provision*. The nondestructive examination method and acceptance criteria of the 1992 or later of Section III shall be met when performing system leakage tests (in lieu of a hydrostatic test) in accordance with IWA-4520 after repair and replacement activities performed by welding or brazing on a pressure retaining boundary using the 2003 Addenda through the latest edition and addenda of Section XI incorporated by reference in paragraph (a)(1)(ii) of this section. The nondestructive examination and pressure testing may be performed using procedures and personnel meeting the requirements of the licensee's/applicant's current ISI code of record.

(C) *Section XI condition: System leakage tests: Third provision*. The use of the provisions for an alternative BWR pressure test at reduced pressure to satisfy IWA-4540 requirements as described in IWA-5213(b)(2), IWB-5210(c) and IWB-5221(d) of Section XI, 2017 Edition may be used subject to the following conditions:

(*1*) The use of nuclear heat to conduct the BWR Class 1 system leakage test is prohibited (i.e., the reactor must be in a non-critical state), except during refueling outages in which the ASME Section XI Category B-P pressure test has already been performed, or at the end of mid-cycle maintenance outages fourteen (14) days or less in duration.

(*2*) In lieu of the test condition holding time of IWA-5213(b)(2), after pressurization to test conditions, and before the visual examinations commence, the holding time shall be 1 hour for non-insulated components.

* * * * *

(xxi) * * *

(A) [Reserved]

(B) *Section XI condition: Table IWB–2500–1 examination*. Use of the provisions of IWB-2500(f) and (g) and Table IWB-2500-1 Notes 6 and 7 of the 2017 Edition of ASME Section XI for examination of Examination Category B-D Item Numbers B3.90 and B3.100 shall be subject to the following conditions:

(*1*) A plant-specific evaluation demonstrating the criteria of IWB-2500(f) are met must be maintained in accordance with IWA-1400(l).

(*2*) The use of the provisions of IWB-2500(f) and Table IWB-2500-1 Note 6 for examination of Examination Category B-D Item Numbers B3.90 is prohibited for plants with renewed licenses in accordance with 10 CFR part 54.

(*3*) The provisions of IWB-2500(g) and Table IWB-2500-1 Notes 6 and 7 for examination of Examination Category B-D Item Numbers B3.90 and B3.100 shall not be used

to eliminate the preservice or inservice volumetric examination of plants with a Combined Operating License pursuant to 10 CFR part 52, or a plant that receives its operating license after October 22, 2015.

* * * * *

(xxv) *Section XI condition: Mitigation of defects by modification*. Use of the provisions of IWA-4340 shall be subject to the following conditions:

(A) *Mitigation of defects by modification: First provision*. The use of the provisions for mitigation of defects by modification in IWA-4340 of Section XI 2001 Edition through the 2010 Addenda, is prohibited.

(B) *Mitigation of defects by modification: Second provision*. The use of the provisions for mitigation of defects by modification in IWA-4340 of Section XI 2011 Edition through the 2017 Edition may be used subject to the following conditions:

(*1*) The use of the provisions in IWA 4340 to mitigate crack-like defects or those associated with flow accelerated corrosion are prohibited.

(*2*) The design of a modification that mitigates a defect shall incorporate a loss of material rate either 2 times the actual measured corrosion rate in that pipe location (established based on wall thickness measurements conducted at least twice in two prior consecutive or nonconsecutive refueling outage cycles in the 10 year period prior to installation of the modification), or 4 times the estimated maximum corrosion rate for the piping system.

(*3*) The Owner shall perform a wall thickness examination in the vicinity of the modification and relevant pipe base metal during each refueling outage cycle to detect propagation of the flaw into the material credited for structural integrity of the item unless the examinations in the two refueling outage cycles subsequent to the installation of the modification are capable of validating the projected flaw growth.

(xxvi) *Section XI condition: Pressure testing Class 1, 2, and 3 mechanical joints*. When using the 2001 Edition through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of this section, licensees shall pressure test mechanical joints in Class 1, 2, and 3 piping and components greater than NPS-1 which are disassembled and reassembled during the performance of a Section XI activity (e.g., repair/replacement activity), in accordance with IWA-5211(a). The pressure test and examiners shall meet the requirements of the licensee's/applicant's current ISI code of record.

* * * * *

(xxxii) *Section XI condition: Summary report submittal*. When using ASME BPV Code, Section XI, 2010 Edition through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of this section, Summary Reports and Owner's Activity Reports described in IWA–6230 must be submitted to the NRC. Preservice inspection reports for examinations prior to commercial service shall be submitted prior to the date of placement of the unit into commercial service. For preservice and inservice examinations performed following placement of the unit into commercial service, reports shall be submitted within 90 calendar days of the completion of each refueling outage.

* * * * *

(xxxiv) *Section XI condition: Nonmandatory Appendix U*. When using Nonmandatory Appendix U of the ASME BPV Code, Section XI, 2013 Edition through the latest edition incorporated by reference in paragraph (a)(1)(ii) of this section, the following conditions apply:

* * * * *

(xxxv) *Section XI condition: Use of RT_{T0} in the K_{Ia} and K_{Ic} equations.*

(A) When using the 2013 Edition of the ASME BPV Code, Section XI, Appendix A, paragraph A-4200, if T_0 is available, then RT_{T0} may be used in place of RT_{NDT} for applications

using the K_{Ic} equation and the associated K_{Ic} curve, but not for applications using the K_{Ia} equation and the associated K_{Ia} curve.

(B) When using the 2015 Edition of the ASME BPV Code, Section XI, Appendix A, paragraph A–4200 subparagraph (c) RT_{KIa} shall be defined as $RT_{KIa} = T0 + 90.267 \exp(-0.003406T0)$.

* * * * *

(xxxviii) Section XI condition: ASME Code Section XI Appendix III Supplement 2. Licensees applying the provisions of ASME Code Section XI Appendix III Supplement 2, "Welds in Cast Austenitic Materials," are subject to the following conditions:

(A) ASME Code Section XI Appendix III Supplement 2: First provision. In lieu of Paragraph (c)(1)(-c)(-2), licensees shall use a search unit with a center frequency of 500 kHz with a tolerance of +/- 20 percent.

(B) ASME Code Section XI Appendix III Supplement 2: Second provision. In lieu of Paragraph (c)(1)(-d), the search unit shall produce angles including, but not limited to, 30 to 55 degrees with a maximum increment of 5 degrees.

(xxxix) *Section XI condition: Defect Removal*. The use of the provisions for removal of defects by welding or brazing in IWA-4421(c)(1) and IWA-4421(c)(2) of Section XI, 2017 Edition may be used subject to the following conditions:

(A) *Defect removal requirements: First provision*. The provisions of subparagraph IWA 4421(c)(1) shall not be used to contain or isolate a defective area without removal of the defect.

(B) *Defect removal requirements: Second provision.* The provisions of subparagraph IWA 4421(c)(2) shall not be used for crack-like defects.

(xl) *Section XI condition: Prohibitions on use of IWB-3510.4(b)*. The use of ASME BPV Code, Section XI, subparagraphs IWB-3510.4(b)(4) and IWB-3510.4(b)(5) is prohibited.

(xli) *Section XI condition: Preservice Volumetric and Surface Examinations Acceptance.* The use of the provisions for accepting flaws by analytical evaluation during preservice inspection in IWB-3112(a)(3) and IWC-3112(a)(3) of Section XI, 2013 Edition through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of this section is prohibited.

(xlii) *Section XI condition: Steam Generator Nozzle-to-Component welds and Reactor Vessel Nozzle-to-Component welds.* Licensees applying the provisions of Table IWB-2500-1, Examination Category B-F, Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles, Item B5.11 (NPS 4 or Larger Nozzle-to-Component Butt Welds) of the 2013 Edition through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of this section and Item B5.71 (NPS 4 or Larger Nozzle-to-Component Butt Welds) of the 2011a Addenda through the latest edition and addenda incorporated by reference in paragraph (a)(1)(ii) of this section must also meet the following conditions:

(A) Ultrasonic examination procedures, equipment, and personnel shall be qualified by performance demonstration in accordance with Mandatory Appendix VIII.

(B) When applying the examination requirements of Figure IWB-2500-8, the volumetric examination volume shall be extended to include 100 percent of the weld volume, except as provided in paragraph (b)(2)(xlii)(B)(*1*) of this section:

(*1*) When the examination volume that can be qualified by performance demonstration is less than 100 percent of the weld volume, the licensee may ultrasonically examine the qualified volume and perform a flaw evaluation of the largest hypothetical crack that could exist in the volume and not be qualified for ultrasonic examination, subject to prior NRC authorization in accordance with paragraph (z) of this section.

(*2*) [Reserved]

(3) * * * When implementing the ASME OM Code, conditions are applicable only as specified in the following paragraphs:

* * * * *

(iv) *OM condition: Check valves (Appendix II)*. Licensees applying Appendix II of the ASME OM Code, 2003 Addenda through the 2015 Edition, is acceptable for use with the following requirements. Trending and evaluation shall support the determination that the valve or group of valves is capable of performing its intended function(s) over the entire interval. At least one of the Appendix II condition monitoring activities for a valve group shall be performed on each valve of the group at approximate equal intervals not to exceed the maximum interval shown in the following table:

* * * * *

(A through D) [Reserved]

* * * * *

(ix) *OM condition: Subsection ISTF*. Licensees applying Subsection ISTF, 2012 Edition or 2015 Edition, shall satisfy the requirements of Mandatory Appendix V, "Pump Periodic Verification Test Program," of the ASME OM Code in that edition. Subsection ISTF, 2011 Addenda, is prohibited for use.

* * * * *

(xi) *OM condition: Valve Position Indication*. When implementing paragraph ISTC-3700, "Position Verification Testing," in the ASME OM Code, 2012 Edition through the latest edition and addenda of the ASME OM Code incorporated by reference in paragraph (a)(1)(iv) of this section, licensees shall verify that valve operation is accurately indicated by supplementing valve position indicating lights with other indications, such as flow meters or other suitable instrumentation, to provide assurance of proper obturator position for valves with remote position indication within the scope of Subsection ISTC and all mandatory appendices.

(xii) *OM condition: Air-operated valves (Appendix IV)*. When implementing ASME OM Code, 2015 Edition, licensees shall also apply the provisions in Appendix IV, "Preservice and Inservice Testing of Active Pneumatically Operated Valve Assemblies in Nuclear Power Plants," of the 2017 Edition of the ASME OM Code.

* * * * *

(f) * * *

(7) *Inservice Testing Reporting Requirements*. Inservice Testing Program Test and Examination Plans (IST Plans) required by the ASME OM Code must be submitted to the NRC in accordance with § 50.4. All required IST Plan submittals must be made within 90 days of their implementation. Electronic submission is preferred. In addition to the IST Plans for the preservice test period, initial inservice test interval, and successive inservice test intervals specified in the ASME OM Code, interim IST Plan updates that involve changes to the following must be submitted:

(i) The edition and addenda of ASME OM Code that apply to required tests and examinations;

(ii) The classification of components and boundaries of system classification;

(iii) Identification of components subject to tests and examination;

(iv) Identification of components exempt from testing or examination;

(v) ASME OM Code requirements for components and the test or examination to be performed;

(vi) ASME OM Code requirements for components that are not being satisfied by the tests or examinations; and justification for alternative tests or examinations;

(vii) ASME OM Code Cases planned for use and the extent of their application; or

(viii) Test or examination frequency or schedule for performance of tests and examinations, as applicable.

* * * * *

(g) * * *

(6) * * *

(ii) * * *

(C) [Reserved]

(D) *Augmented ISI requirements: Reactor vessel head inspections*—(*1*) *Implementation*. Holders of operating licenses or combined licenses for pressurized-water reactors as of or after **[DATE 75 DAYS AFTER EFFECTIVE DATE OF FINAL RULE]** shall implement the requirements of ASME BPV Code Case N-729-6 instead of ASME BPV Code Case N-729-4, subject to the conditions specified in paragraphs (g)(6)(ii)(D)(2) through (8) of this section, by no later than one year after **[DATE 75 DAYS AFTER EFFECTIVE DATE OF FINAL RULE]**. All previous NRC-approved alternatives from the requirements of paragraph (g)(6)(ii)(D) of this section remain valid.

(*2*) *Appendix I use*. If Appendix I is used, Section I 3000 must be implemented to define an alternative examination area or volume.

* * * * *

(*4*) *Surface exam acceptance criteria*. In addition to the requirements of paragraph 3132.1(b) of ASME BPV Code Case N-729-6, a component whose surface examination detects rounded indications greater than allowed in paragraph NB-5352 in size on the partial-penetration or associated fillet weld shall be classified as having an unacceptable indication and corrected in accordance with the provisions of paragraph 3132.2 of ASME BPV Code Case N-729-6.

(*5*) *Peening*. In lieu of inspection requirements of Table 1, Items B4.50 and B4.60, and all other requirements in ASME BPV Code Case N-729-6 pertaining to peening, in order for a RPV upper head with nozzles and associated J-groove welds mitigated by peening to obtain

inspection relief from the requirements of Table 1 for unmitigated heads, peening must meet the performance criteria, qualification, and inspection requirements stated in MRP-335, Revision 3-A, with the exception that a plant-specific alternative request is not required and NRC condition 5.4 of MRP-335, Revision 3-A does not apply.

(*6*) *Baseline Examinations*. In lieu of the requirements for Note 7(c) the baseline volumetric and surface examination for plants with a RPV Head with less than 8 EDY shall be performed by 2.25 reinspection years (RIY) after initial startup not to exceed 8 years.

(*7*) *Sister Plants*. Note 10 of ASME BPV Code Case N-729-6 shall not be implemented without prior NRC approval.

(*8*) *Volumetric Leak Path*. In lieu of paragraph 3200(b) requirement for a surface examination of the partial penetration weld, a volumetric leak path assessment of the nozzle may be performed in accordance with Note 6 of Table 1 of N-729-6.

* * * * *

(F) *Augmented ISI requirements: Examination requirements for Class 1 piping and nozzle dissimilar-metal butt welds*—(*1*) *Implementation*. Holders of operating licenses or combined licenses for pressurized-water reactors as of or after **[DATE 75 DAYS AFTER EFFECTIVE DATE OF FINAL RULE]**, shall implement the requirements of ASME BPV Code Case N-770-5 instead of ASME BPV Code Case N-770-2, subject to the conditions specified in paragraphs (g)(6)(ii)(F)(*2*) through (*16*) of this section, by no later than one (1) year after **[DATE 75 DAYS AFTER EFFECTIVE DATE OF FINAL RULE]**. All NRC authorized alternatives from previous versions of paragraph (g)(6)(ii)(F) of this section remain applicable.

(*2*) *Categorization*. (*i*) Welds that have been mitigated by the Mechanical Stress Improvement Process (MSIPTM) may be categorized as Inspection Items D or E, as appropriate, provided the criteria in Appendix I of the code case have been met.

(*ii*) In order to be categorized as peened welds, in lieu of inspection category L requirements and inspections, welds must meet the performance criteria, qualification and inspection requirements as stated by MRP-335, Revision 3-A, with the exception that no plant-specific alternative is required.

(*iii*) Other mitigated welds shall be identified as the appropriate inspection item of the NRC authorized alternative or NRC-approved code case for the mitigation type in Regulatory Guide 1.147.

(*iv*) All other butt welds that rely on Alloy 82/182 for structural integrity shall be categorized as Inspection Items A-1, A-2, B-1 or B-2, as appropriate.

(*v*) Paragraph -1100(e) of ASME BPV Code Case N-770-5 shall not be used to exempt welds that rely on Alloy 82/182 for structural integrity from any requirement of this section.

(*3*) [Reserved]

* * * * *

(*4*) *Examination coverage.* When implementing Paragraph -2500(a) of ASME BPV Code Case N-770-5, essentially 100 percent of the required volumetric examination coverage shall be obtained, including greater than 90 percent of the volumetric examination coverage for circumferential flaws. Licensees are prohibited from using Paragraphs -2500(c) and -2500(d) of ASME BPV Code Case N-770-5 to meet examination requirements.

* * * * *

(*6*) *Reporting requirements*. The licensee will promptly notify the NRC regarding any volumetric examination of a mitigated weld that detects growth of existing flaws in the required examination volume that exceed the previous IWB-3600 flaw evaluations, new flaws, or any indication in the weld overlay or excavate and weld repair material characterized as stress corrosion cracking. Additionally the licensee will submit to the NRC a report summarizing the

evaluation, along with inputs, methodologies, assumptions, and causes of the new flaw or flaw growth within 30 days following plant startup.

* * * * *

(*9*) *Deferrals*. (*i*) The initial inservice volumetric examination of optimized weld overlays, Inspection Item C-2, shall not be deferred.

(*ii*) Volumetric inspection of peened dissimilar metal butt welds shall not be deferred.

(iii) For Inspection Item M-2, N-1 and N-2 welds the second required inservice volumetric examination shall not be deferred.

(*10*) *Examination technique.* Note 14(b) of Table 1 and Note (b) of Figure 5(a) of ASME BPV Code Case N-770-5 may only be implemented if the requirements of Note 14(a) of Table 1 of ASME BPV Code Case N-770-5 cannot be met.

(*11*) *Cast stainless steel.* Examination of ASME BPV Code Class 1 piping and vessel nozzle butt welds involving cast stainless steel materials, will be performed with Appendix VIII, Supplement 9 qualifications, or qualifications similar to Appendix VIII, Supplement 2 or 10 using cast stainless steel mockups no later than the next scheduled weld examination after January 1, 2022, in accordance with the requirements of Paragraph -2500(a) or, as an alternative, using inspections that meet the requirements of ASME Code Case N-824 as conditioned in Regulatory Guide 1.147.

* * * * *

(*13*) *Encoded ultrasonic examination*. Ultrasonic examinations of non-mitigated or cracked mitigated dissimilar metal butt welds in the reactor coolant pressure boundary must be performed in accordance with the requirements of Table 1 for Inspection Item A-1, A-2, B-1, B-2, E, F-2, J, K, N-1, N-2 and O for essentially 100 percent of the required inspection volume using an encoded method.

(*14*) *Excavate and weld repair cold leg*. For cold leg temperature M-2, N-1 and N-2 welds, initial volumetric inspection after application of an excavate and weld repair (EWR) shall be performed during the second refueling outage.

(*15*) *Cracked excavate and weld repair*. In lieu of the examination requirements for cracked welds with 360 excavate and weld repairs, Inspection Item N-1 of Table 1, welds shall be examined during the first or second refueling outage following EWR. Examination volumes that show no indication of crack growth or new cracking shall be examined once each inspection interval thereafter.

(*16*) *Partial arc excavate and weld repair.* Inspection Item O cannot be used without NRC review and approval.

* * * * *

Dated at Rockville, Maryland, this 16th day of October, 2018.

For the Nuclear Regulatory Commission.

/RA/

Ho K. Nieh, Director,
Office of Nuclear Reactor Regulation.