



**Nondestructive Evaluation Program \_\_\_\_\_ 20151130-001**

Via Email

November 30, 2015

Secretary, U.S. Nuclear Regulatory Commission  
Washington, DC 20055-001  
ATTN: Rulemakings and Adjudications Staff

**Subject: 10CFR50.55a Proposed Rulemaking Comments  
RIN 3150-AI97 (Docket ID NRC-2011-0088)**

Dear Sir or Madam,

This letter provides comments to the subject proposed rulemaking on behalf of the Nuclear Nondestructive Examination (NDE) Program at the Electric Power Research Institute.

The way we have interpreted the proposed rule, issued in draft form on September 18th, 2015, §50.55a(a)(1)(ii)(C)(50) through (53) incorporate by reference the 2009 Addenda, 2010 Edition, 2011 Addenda, and 2013 Edition to the ASME BPV Code, Section XI, Division 1, with conditions on their use. We have interpreted paragraph (b)(2)(xv) to state that licensees using the 1995 Edition with 1996 Addenda through the 2001 Edition of Section XI shall use the edition and addenda of Appendix VIII that corresponds to the Code year of Section XI that they are using. That licensees using the 2002 Addenda up to the 2006 Addenda of Section XI, shall use the 2001 Edition of Appendix VIII. And, finally, that licensees using editions and addenda of Section XI beyond the 2006 Addenda shall use the edition or addenda of Appendix VIII that corresponds with the Code year of Section XI that they are using. If these interpretations are correct, then we have the following comments to the proposed rulemaking.

**EPRI NDE Comment No. 1** – If Appendix VIII versions contained in the 2009 Addenda through the 2013 Edition of Section XI are now to be incorporated by reference into 10CFR50.55a, the industry will need time to update its Appendix VIII ultrasonic qualification program and procedures to accommodate this change:

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Since the industry is currently working to Appendix VIII, as contained in the 1996 Addenda through the 2001 Edition of Section XI, as well as that contained in the 2007 Edition with 2008 Addenda of Section XI, there would be no issues with 10CFR50.55a continuing to require licensees to use these versions. However, it is recognized that much work has transpired within the ASME Section XI Code committees, between 1996 and 2013, to update Appendix VIII and to eliminate the need for the additional provisions within 10CFR50.55a. While we are not opposed to the use of later versions of Appendix VIII, we are aware that there will be a significant amount of effort involved for the industry to review and revise its Appendix VIII qualification program and procedures to ensure compliance with the newer versions. Therefore, we would make the following request:

*Request for delayed implementation:* The EPRI NDE staff request that the date for mandatory implementation of Appendix VIII, as contained in the 2009 Addenda through the 2013 Edition of Section XI be delayed for a minimum of 18 months, after the publishing of the final rule, in order to allow time to make all the necessary program and procedure revisions and to communicate these changes to the industry.

*Suggested Modification:* To accommodate the request above, we suggest that the last sentence of §50.55a(g)(4)(ii) should be modified to, “However, a licensee whose inservice inspection interval commences during the 12 through 18-month period after [Approval Date of this Final Rule], may delay the update of their Appendix VIII program by up to 18 months after [Approval Date of this Final Rule].”

**EPRI NDE Comment No. 2** – Allowing multiple incompatible versions of Section XI, Appendix VIII to be used by licensees continues to create a hardship on the industry for consistent implementation of an Appendix VIII qualification program.

The proposed revision to §50.55a(a)(1)(ii)(C)(50) through (53) - incorporates by reference the 2009 Addenda through the 2013 Edition of Section XI of the ASME B&PV Code, with conditions. When combined with paragraph (b)(2)(xv), the resulting regulation will have various licensees invoking distinctly different versions of Appendix VIII. Licensees using the 1995 Edition with 1996 Addenda through the 2001 Edition of Section XI would implement the edition and addenda of Appendix VIII that corresponds to the Code year of Section XI that they are using. Licensees using the 2002 through 2006 Addenda of Section XI would still implement the 2001 Edition of Appendix VIII. Licensees updating to the 2007 Edition, with 2008 Addenda, through the 2013 Editions of Section XI would be

expected to implement the version of Appendix VIII corresponding to the Code year to which they were updating.

Appendix VIII in the 1995 through 2001 Editions of Section XI are inconsistent, in certain respects, with Appendix VIII in the 2008 Addenda through the 2013 Edition. For instance, the titles and corresponding scopes of Supplements 5 and 7 have significantly changed, over those years. Additionally, there have been a significant number of Code actions to clarify the rules in Appendix VIII supplements, since the publishing of the 1995 Edition with 1996 Addenda. All of this creates difficulty with maintaining an industry qualification program or one set of generic industry inspection procedures that effectively encompasses all these Code years. While the incremental revisions to Appendix VIII have not introduced insurmountable technical impacts, meeting the requirements of all of them, simultaneously, will require that the industry qualification program, procedures, and qualification records be reviewed, at a minimum, and potentially modified in order to accommodate all possible versions that may be implemented in the nuclear fleet. These types of programmatic challenges require significant time and industry resources to resolve, and lend themselves to increased human performance errors in implementation.

A relatively simple solution to this issue would be if all licensees, subject to 10CFR50.55a, were allowed to automatically adopt the version of Appendix VIII that resides in the latest NRC approved edition and addenda of Section XI, with no prior Commission approval being required. This would enable an industry qualification program, such as the EPRI Performance Demonstration Program, to review and update to one version of Appendix VIII each time 10CFR50.55a was revised. And each licensee would simply have to reference the EPRI Performance Demonstration Program compliance document in their ISI program.

*Request for provision to allow licensees to elect to use the latest edition and addenda of Appendix VIII:* Based on the discussion above, The EPRI NDE staff request that 10CFR50.55a be modified to contain a provision that allows licensees to elect to use Appendix VIII from the latest edition and addenda of the ASME Boiler and Pressure Vessel Code that is incorporated by reference in 10CFR50.55a, without Commission pre-approval.

*Suggested Modification:* To accommodate the request above, we suggest the addition of the following sentence to the end of §50.55a(b)(2)(xv) – “Licensees may elect to use Appendix VIII in the latest edition and addenda of the ASME Boiler and Pressure Vessel Code that is incorporated by reference in paragraph (a) of this section, subject to any applicable provisions listed in paragraph (b) of this section.

We recognize that licensees may request approval to use all or portions of later editions and addenda of the ASME Code, Section XI that are incorporated by reference in §50.55a using the guidance in NRC Regulatory Issue Summary 2004-12. However, a simple change to §50.55a(b)(2)(xv), as recommended above, would eliminate the administrative burden associated with the development, submittal, and approval of these requests.

**EPRI NDE Comment No. 3** – The title of §50.55a(b)(2)(xvi)(A) should be changed, since that provision is only applicable to ferritic vessel examinations.

§50.55a(b)(2)(xvi), which proceeds the paragraph referenced above, is entitled “*Section XI condition: Appendix VIII single side ferritic vessel and piping and stainless steel piping examinations.*” However, for some reason, both of the provisions underneath it contain “*Ferritic and stainless steel piping examinations:*” within the title. It is clear that subparagraph (A), which contains the first provision, only pertains to single side examinations of ferritic vessel welds. Therefore, the title should reflect that fact.

*Suggested Modification:* To resolve the issue described above, we suggest that the title of §50.55a(b)(2)(xvi)(A) should be changed to, “*Ferritic vessel examinations: First provision.*”

#### **EPRI NDE Comment No. 4**

§50.55a(b)(2)(xv)(A)(2) states “*dissimilar metal weld qualifications must be demonstrated from the austenitic side of the weld, and the qualification may be expanded for austenitic welds with no austenitic sides using a separate add-on performance demonstration. Dissimilar metal welds may be examined from either side of the weld.*”

It is our understanding that the intent of the requirement, above, is to ensure that single-sided ultrasonic qualifications of dissimilar metal welds are always performed from the most conservative direction. It should be noted, however, that there are several common dissimilar-metal welded component configurations, in both boiling water reactor (BWR) and pressurized water reactor (PWR) piping systems, which either do not have an austenitic side, or for which ultrasonic scan access is only available from the ferritic side of the weld. For this reason, we think that a realistic single side Supplement 10 qualification should include examples of these common configurations in the full procedure, personnel, and equipment qualification process (not just as add-ons). Therefore, 10CFR50

should not contain requirements that would exclude commonly found configurations from the qualification test that are needed to reliably detect, size, and characterize flaws in realistic and challenging plant conditions.

The industry has worked with NRC staff via the American Society of Mechanical Engineers (ASME) Code to specifically address this issue, and have been successful in introducing Code actions that have become ASME board approved. Specifically, Code action BC 14-1374 introduced words into Code Case N-695-1 to address these requirements. In addition, Code action BC 14-1375 incorporated the same changes into the 2015 Edition of ASME Section XI, which has subsequently been published.

*Suggested Modification:* To resolve the issue described above, we recommend the following changes to the words in §50.55a(b)(2)(xv)(A)(2), that address single side qualification of dissimilar metal welds, to be consistent with the changes made to board approved Code Case N-695-1 and the 2015 Edition of the ASME Boiler and Pressure Vessel Code – Section XI:

*“Single side dissimilar metal weld qualifications shall be performed with specimen sets that contain a range of access restrictions. For components that have scan access from both the ferritic and austenitic sides, qualification shall be performed from the austenitic side of the weld only. For components with no austenitic side, or for which scan access is limited to the ferritic side only, qualification may be performed from the ferritic side. Dissimilar metal welds may be examined from either side of the weld.”*

#### **EPRI NDE Comment No. 5**

§50.55a(g)(6)(ii)(F)(11) states *“Cast stainless steel: Examination of ASME Code Class 1 piping and vessel nozzle butt welds involving cast stainless steel materials, shall 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, 2020, in accordance with the requirements of paragraph -2500(a).”*

Appendix VIII Supplement 9 has been in the course of preparation for many years. Industry has continually worked with the NRC, via the ASME Code process, to work out appropriate rules for the qualification of procedures, personnel, and equipment to examine cast stainless steel. Due to the complexities involved in the ultrasonic examination of this material, additional research has been warranted to support the development of these rules and,

while a great deal of progress has been made, there is still a significant amount of work left to be done.

In order to put together an industry ultrasonic qualification program, qualification rules must first be established, within ASME Code, and must also be endorsed by NRC, via rule making (i.e., 10CFR50.55a or Reg Guide 1.147, as appropriate). Once rules have been established, it will take time to survey the fleet (approximately one year), design and fabricate samples (approximately two years), develop testing protocols (approximately one year) and conduct the performance demonstrations (approximately two years). These estimates are based on lessons learned by the EPRI Performance Demonstration Program during the development and implementation of other complex Appendix VIII Supplements, such as Supplement 10.

To resolve the issues described above, we recommend not including proposed paragraph (g)(6)(ii)(F)(11) in the next revision of § 50.55a, and instead delaying this requirement until such time as ASME has board approved the inclusion of qualification requirements for cast austenitic stainless steel into Section XI of the B&PV Code AND the NRC has endorsed those rules, via rulemaking. Further, once these rules have been established, we would ask that the NRC consider providing for a six year grace period before examinations are required to be performed with qualified procedures, personnel, and equipment. This will allow time for the industry to perform the necessary steps, outlined in the previous paragraph, to successfully implement the required qualification processes.

#### **EPRI NDE Comment No. 6**

§ 50.55a(b)(2)(xxxvii) states, *“Section XI condition: ASME BPV Code Case N-824. Licensees may use the provisions of ASME BPV Code Case N-824, “Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1,” subject to the following conditions.*

*(A) Ultrasonic examinations must be spatially encoded.*

*(B) Instead of Paragraph 1(c)(1)(-a) licensees shall use dual, transmit-receive, refracted longitudinal wave, multi-element phased array search units.*

*(C) Instead of Paragraph 1(c)(1)(-c)(-1), licensees shall use a phased array search unit with a center frequency between 500 kHz and 1 MHz.*

*(D) Instead of Paragraph 1(c)(1)(-c)(-2), licensees shall use a phased array search unit with a center frequency of 500 kHz.*

*(E) Instead of Paragraph 1(c)(1)(-d), the phased array search unit must produce angles from 30 to 70 degrees with a maximum increment of 5 degrees.”*

As currently proposed, § 50.55a(b)(2)(xxxvii)(A) would require all ultrasonic examinations performed in accordance with ASME BPV Code Case N-824 to be encoded. Unfortunately, field conditions do not always allow for the collection of encoded ultrasonic data for off-line analysis, due to permanent obstructions (walls, floors, whip restraints, branch connections, etc.). Understanding this field implementation challenge, Code Case N-824 allows the use of manual scans when the collection of encoded ultrasonic data is not practical. Therefore, we think that the existing wording in Paragraph 1(c)(10) of ASME BPV Code Case N-824, related to the collection of ultrasonic data, is sufficient and the new § 50.55a(b)(2)(xxxvii)(A) is not necessary and in many cases would be impossible to implement.

Also as currently proposed, § 50.55a(b)(2)(xxxvii)(B) through (E) would require the use of phased array search units. While it is recognized that a great deal of the recent industry research for cast austenitic stainless steel applications has utilized ultrasonic phased array transducers, conventional search units have also been demonstrated to be effective, especially when the thickness and internal geometry of the component to be inspected are well understood. In fact, when the required angle and focal depth is well understood, a properly designed monolithic transducer and wedge combination is capable of transferring more ultrasonic energy to the desired location, which should result in a more effective examination. Additionally, even when employing phased array technologies, it has often been shown that only a few of the lower discrete angles prove to be effective for flaw detection. This suggests that conventional fixed angled transducers could also be used effectively. ASME BPV Code Case N-824 gives plant owners the option to use either conventional or phased array ultrasonic search units for examination of cast austenitic stainless components, and based on the research, cited above, we think that this guidance is sufficient, as written, and a hard requirement to limit the examination technology to phased array search units is not supported by the available research.

Also as currently proposed, § 50.55a(b)(2)(xxxvii)(C) would require that a center frequency of 500 kHz to 1 MHz be used on piping less than or equal to 1.6 inches in thickness, instead of the requirements of ASME BPV Code Case N-824, Paragraph 1(c)(1)(-c)(-1). Pacific Northwest National Laboratories (PNNL) has published a report which shows effective ultrasonic results being obtained using from 800 kHz all the way up to 2.0 MHz probe frequencies (see An Evaluation of Ultrasonic Phased Array Testing for Cast Austenitic Stainless Steel Pressurizer Surge Line Piping Welds (NUREG/CR-7122, PNNL-19497)). These probe frequencies, used by PNNL, were considered in the development of N-824. For this reason, we think that the existing wording in ASME BPV Code Case N-824 Paragraph 1(c)(1)(-c)(-1), which allows probe frequencies higher than 1

MHz for piping less than or equal to 1.6 inches is backed up by a strong technical basis, and the frequency limitations in the proposed new paragraph (C) are not supported by the available research.

As currently proposed, § 50.55a(b)(2)(xxxvii)(D) would require the use of a center frequency of 500 kHz, instead of the requirements of Paragraph 1(c)(1)(-c)(-2), when examining piping greater than 1.6 inches in thickness. Because industry research conducted by PNNL and others has shown that 500 kHz ultrasonic transducers are effective for cast austenitic stainless steel piping greater than 1.6 inches in thickness, we agree with the requirement that 500 kHz probes be used for this thickness range.

Finally as currently proposed, § 50.55a(b)(2)(xxxvii)(E) would require the use of a phased array search unit which produces angles from 30 to 70 degrees, with a maximum increment of 5 degrees, instead of the requirements of Paragraph 1(c)(1)(-d). As previously discussed, only a small range of ultrasonic angles have been shown to be effective for cast austenitic stainless steel applications based on recent industry research activities. As such, the available research would support the use of conventional ultrasonic search units having fixed inspection angles. Additionally, PNNL conducted research in 2007 regarding heavy-walled cast austenitic stainless steel piping welds (see Assessment of Crack Detection in Heavy-Walled Cast Stainless Steel Piping Welds Using Advanced Low-Frequency Ultrasonic Methods (NUREG/CR-6933, PNNL-16292)), which suggests that the inspection angles found to be effective in detecting flaws in cast austenitic stainless steel materials of this thickness are consistently less than 60°. This PNNL evaluation was considered in the development of Code Case N-824, and supports the angle ranges included in Paragraph 1(c)(1)(-d) of that Case. Therefore, we think that the existing wording in ASME BPV Code Case N-824, Paragraph 1(c)(1)(-d) is sufficiently supported by the available research, and the requirement specified in proposed paragraph (E) are not well supported by the available research.

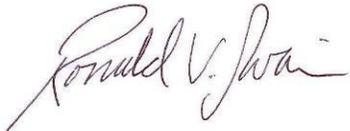
*Suggested Modification:* To resolve the issues described in the preceding paragraphs, we recommend the following changes to § 50.55a(b)(2)(xxxvii):

*“Section XI condition: ASME BPV Code Case N-824. Licensees may use the provisions of ASME BPV Code Case N-824, “Ultrasonic Examination of Cast Austenitic Piping Welds From the Outside Surface Section XI, Division 1,” subject to the following condition.*

*A) Instead of Paragraph 1(c)(1)(-c)(-2), licensees shall use a search unit with a center frequency of 500 kHz.”*

We appreciate the opportunity to provide comments to this proposed rulemaking. Should you have any questions pertaining to the comments provided in this letter, please contact Ronnie Swain for clarification.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ronnie Swain".

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