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April 3, 2021

Secretary, U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attn: Rulemaking and Adjudications Staff

Subject: **ASME Comments on Draft Regulatory Guides DG-1366, DG-1367, and DG-1369, and the Proposed Rule Incorporating the Final Revisions of Regulatory Guides 1.84, 1.147, 1.192, and 1.193 into 10 CFR 50.55a, Docket ID NRC–2017–0025**

References:

1. Draft Regulatory Guide DG-1366, (Proposed Revision 39 of Regulatory Guide 1.84, dated January 2021), Design, Fabrication, and Materials Code Case Acceptability, ASME Section III (ADAMS Accession No. ML20120A633)
2. Draft Regulatory Guide DG-1367, (Proposed Revision 20 of Regulatory Guide 1.147, dated January 2021), Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1 (ADAMS Accession No. ML20120A631)
3. Draft Regulatory Guide DG-1368, (Proposed Revision 4 to Regulatory Guide 1.192, dated January 2021), Operation and Maintenance Code Case Acceptability, ASME OM Code (ADAMS Accession No. ML20120A629)
4. Draft Regulatory Guide DG-1369, (Proposed Revision 7 to Regulatory Guide 1.193), ASME Code Cases not Approved for Use (ADAMS Accession No. ML20120A627)
5. Proposed Rule, Federal Register, Vol. 86, No. 20, pp. 7820-7838, Tuesday, February 2, 2021, 10 CFR 50, [NRC-2017-0025], RIN 3150-AJ94, Approval of American Society of Mechanical Engineers' Code Cases

Dear Sir or Madam:

ASME is pleased to have the opportunity to provide comments and suggestions on its Nuclear Code Cases listed in Draft Regulatory Guides DG-1366, DG-1367, DG-1368, and DG-1369 contained in References 1 through 4, and the Proposed Rule to incorporate by reference Regulatory Guides 1.84, 1.147, 1.192, and 1.193 into 10 CFR 50.55a (Reference 5).

ASME supports NRC's endorsement of its Nuclear Code Cases and the NRC's continued effort to complete these updates and rulemakings on a regular basis. To facilitate the NRC

endorsement of Code Cases in the draft regulatory guides, ASME provides the enclosed comments for consideration by the NRC.

ASME's comments on draft Regulatory Guides DG-1366, DG-1367, and DG-1369 are provided in Enclosures 1, 2, and 3, respectively. ASME does not have any comments on draft Regulatory Guide DG-1368, or the proposed 10 CFR 50.55a rule.

If you have any questions, please contact me or direct them to Ms. Allyson Byk, ASME Director, Nuclear Codes and Standards by telephone at (212) 591-8539 or by e-mail (byka@asme.org) and thank you for consideration of our comments.

Very Truly Yours,

Thomas J. Vogan, Chair
ASME Board on Nuclear Codes and Standards
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Enclosures:

1. ASME Comments on Draft Regulatory Guide DG-1366
2. ASME Comments on Draft Regulatory Guide DG-1367
3. ASME Comments on Draft Regulatory Guide DG-1369

cc: Carol Nove, USNRC (carol.nove@nrc.gov)
Officers of the ASME Board on Nuclear Codes and Standards Members
Officers of the ASME Standards Committee on Nuclear Inservice Inspection
Officers of the ASME Standards Committee on Construction of Nuclear Facility Components
Officers of the ASME Standards Committee on Operation and Maintenance of Nuclear Power Plants

Enclosure 1

ASME Comments on Draft Regulatory Guide DG-1366, Inservice Inspection Code Case Acceptability, ASME Section III, Division 1

1. Comments on proposed changes to Regulatory Guide 1.84, Revision 39, Table 1

ASME appreciates the action taken by the NRC to propose the addition of Code Cases N-884 and N-891 to Table 1. ASME had specifically requested that these cases be included in Regulatory Guide 1.84, draft revision 39 by letter dated July, 2019 (ML19261B399). ASME has no additional comments concerning the addition of other Code Cases to Table 1.

2. Comments on proposed changes to Regulatory Guide 1.84, Revision 39, Table 2.

2.1. **N-755-4,** ***Use of Polyethylene (PE) Class 3 Plastic Pipe, Section III, Division 1***

ASME understands that the proposed conditions on the use of this case are consistent with similar requirements specified in Section III, Division 1, Mandatory Appendix XXVI. In addition, with conditional acceptance of Appendix XXVI in 10CFR50.55(a), this Code Case has been annulled so it is suggested it should be moved to Table 4.

2.2. **N-886,** ***Use of Polyethylene Pipe for Class 3, Section III, Division 1***

ASME provides the following comments on the conditions proposed in Table 2:

a. This Code Case is only for **Design** of above ground HDPE piping systems and per the case all other requirements for Materials, Fabrication and Installation, Examination, Testing, Overpressure Protection, Nameplates, Stamping and Reports are to be done in accordance with Appendix XXVI. Conditions (1) thru (3) are the conditions imposed on the use of Appendix XXVI in Section (b)(1)(xi) of the current issue of 10CFR50.55(a) and relate to fabrication and examination. As such they are not applicable to the content of this Code Case and are redundant to the requirements placed on Appendix XXVI in 10CFR50.55(a). This application of redundant requirements on sections of Appendix XXVI not within the scope of this Code Case could result in conflicts should the USNRC change or add requirements to the use of Appendix XXVI in areas other than Design. Therefore, it is strongly suggested these requirements be removed.

b. Proposed condition (4) requires that “For above ground applications licensees must provide active or passive fire protection for HDPE consistent with the safety significance of the affected piping, the risk of fire, the projected fire duration at the affected location, and the mission time of the affected piping.”

   ASME understands that the NRC may impose additional requirements on licensees above and beyond what is required by the ASME Code. However, the ASME Boiler and Pressure Vessel Code, Section III is a component construction code for pressure boundary Integrity. Section III provides no rules for such a design requirement. Such a requirement should be addressed in the plant fire protection program and any specific limitations or requirements for fire protection on the piping system should be communicated by the Piping Design Specification. ASME strongly suggests that the proposed condition be removed or at most be limited to something to the effect of “The use of HDPE piping in above ground applications shall be considered in the Plant fire protection program.”

c. Proposed condition (5) requires that "Carbon Black distribution of HDPE Pipes must be sufficiently homogenous to prevent windows and delamination." ASME believes that the proposed condition should be clarified to address the following questions:

   (i) This issue was reviewed extensively by the ASME and it was determined that this is a pipe manufacturing process issue and not a code issue. It was determined that this issue was adequately addressed by the requirements XXVI-2231(b). Again, this Code Case is only for **Design** and all material requirements must meet the requirements of Appendix XXVI and therefore this limitation would not appear to be applicable to this Code Case.

   (ii) Is the proposed condition applicable to the base HDPE material or only to joints in HDPE piping?

   (iii) What is the acceptance criteria for Carbon Black distribution in HDPE pipe to be "sufficiently homogenous"? This term is not defined here or in the ASME Code and therefore compliance to this condition cannot be demonstrated. Again, this would appear to be addressed in XXVI-2231(b).

   (iv) What is the technical basis for the statement in the draft 10 CFR 50.55(a) rule, page 7827 that "In addition, a condition requiring homogeneous carbon black distribution is needed because experiments have shown that inhomogeneous carbon black distribution can lead to windows and delamination"? If this is the case, it is not clear why this condition was not applied to Appendix XXVI when it was reviewed by the USNRC. This situation could occur in both buried and above ground HDPE piping. Why is it being specifically applied to above ground piping?

   (v) Please clarify what is meant by delamination and clarify what the basis is for this concern?

Considering the above discussion, it is strongly suggested that proposed condition (5) be removed.

Enclosure 2

ASME Comments on Draft Regulatory Guide DG-1367, Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1

1. Comments on proposed changes to Regulatory Guide 1.147, Revision 20, Table 1

ASME appreciates the action taken by the NRC to propose the addition of Code Cases N-561-3, N-768, N-885, and N-892 to Table 1. ASME had specifically requested that these cases be included in Regulatory Guide 1.147, draft revision 20 by letter dated July, 2019 (ML19261B399). ASME has no additional comments concerning the addition of other Code Cases to Table 1.

2. Comments on proposed changes to Regulatory Guide 1.147, Revision 20, Table 2

2.1. N-516-5, *Underwater Welding, Section XI, Division 1*

ASME revised IWA-4661 in the 2013 Edition to change the criteria for weldability to helium content rather than thermal neutron fluence. Prior to the 2013 Edition, IWA-4661 restricted underwater welding to material with predicted thermal neutron fluence not to exceed 10^{17} neutrons per cm^2. Although this terminology is appropriate for underwater welding in BWR's, it is not necessarily appropriate for PWR's, where fast neutron flux has more of an effect on helium generation. BWRVIP-97 identifies predicted helium content (Helium is produced due to the interaction of thermal neutrons with boron and nickel in irradiated stainless steel) rather than predicted fluence as the criteria upon which weldability of irradiated materials should be based.

ASME believes that this condition should be removed and that the NRC should consider removing conditions currently specified in 10 CFR 50.55a(b)(2)(xii) during the next §50.55a rulemaking.

2.2. N-766-3, Nickel Alloy Reactor Coolant Inlay and Onlay for Mitigation of PWR Full Penetration Circumferential Nickel Alloy Dissimilar Metal Welds in Class 1 Items, Section XI, Division 1

a. Proposed condition (1) should be removed as there are no reductions in preservice or inservice examinations.

   3(e)(1) requires preservice and inservice examination to be performed in accordance with Case N-770. Paragraph -2220 in N-770-5 requires that a preservice examination on all items affected by an R/R Activity shall be completed. There is no reduction in the requirement for performing preservice examinations. The inservice examinations are performed in accordance with -2410 of Case N-770-5. The Regulatory Analysis identified a concern with performing flaw evaluation of flaws that exceed the acceptance standards of IWB-3514 thus allowing a flaw with a maximum depth of 75% through-wall in service.

   It should also be noted that while Case N-770 allows a flaw to be analytically accepted in accordance with IWB-3600, the rules of IWA-3000 and IWA-3320 limit the flaw depth to significantly less than 75% through-wall for embedded flaws. For example, based on IWA-3320, the maximum flaw that could be embedded with a 1/8-inch inlay within a 2.5 inch thick nozzle weld is 0.625 inch. The resulting embedded flaw would be about 25% of the total wall thickness. This would also be the end-of-life size for a smaller embedded flaw

considering crack growth. Therefore, the ASME Section XI rules adequately address any flaw depth concerns.

Regarding flaw length, ASME believes that it is unnecessary to restrict the allowable flaw lengths to those specified in the NRC condition. Case N-766-3, paragraph 2(c)(2) requires that the detected flaw depths and lengths be used to perform a crack growth evaluation in accordance with IWA-3640. In addition, paragraph 2(c)(2) requires analysis of postulated flaws with depths of 10%. The lengths of these flaws shall be equal to the full circumference for circ flaws and the entire width of the DMW weld and butter for axial flaws. ASME believes these rules negate and reason for the flaw length restrictions in the regulatory guide.

Finally, once the inlay/onlay is installed, the DMW is isolated from the reactor coolant environment. Therefore, the embedded flaw can no longer grow by PWSCC. To ensure that the embedded flaw at the inlay/onlay interface does not grow through the inlay/onlay, paragraph 2(c) of N-766-1 requires performance of a fatigue crack growth evaluation of the detected flaw and postulated flaws in accordance with IWB-3600.

b. Proposed condition (2) requires that, “In lieu of Paragraph 2(e) of the Code Case, pipes with any thickness of inlay or onlay must be evaluated for weld shrinkage, pipe system flexibility, and additional weight of the inlay or onlay.”

ASME believes there is insufficient technical basis to require evaluation of a thin inlay/onlay of thickness less than or equal to 1/8 of the repaired pipe wall thickness. The shrinkage from an inlay/onlay that is ≤1/8t is negligible and will have no significant effect on the piping system support loads, design clearances, nozzle loads, changes in the system flexibility, or a significant weight increase.

The axial length of a weld overlay, assuming full circumference, can have an impact on the magnitude of weld shrinkage. However, the axial length of an inlay/onlay has a negligible effect since the inlay/onlay only extends approximately ¼” past the weld fusion lines and therefore the full inlay/onlay thickness is only required to be about 3 inches in total length. For a thickness of t/8, the resulting volume is far too small to have an impact. In fact, the requirement to evaluate this effect for inlays or onlays greater that t/8 is itself very conservative, as much larger thicknesses are unlikely to have any impact.

The requirement in paragraph 2(e) of Case N-766-1 is also in Case N-740 for installation of weld overlays with the exception of the t/8 thickness exemption. There is a reason for this. The volume of weld metal required to install a weld overlay is much greater than that required for an inlay/onlay. While an inlay/onlay is only required to be 1/8” thick, the thickness of a weld overlay is at least 33% of the base material thickness. While an inlay/onlay is only required to extend ¼” on either side of the root of the DMW and butter, a weld overlay is required to extend 0.75 $\sqrt{Rt}$ on either side of the DMW face and butter along the outside diameter of the weld. Therefore, ASME does not believe this condition is necessary.

c. Proposed condition (3) requires that "the subject weld must be inspected by three successive examinations" if the weld exceeded the acceptance standards of IWB-3514 and was accepted in accordance with IWB-3132.3 or IWB-3142.4.

   Successive examination requirements for inlays/onlays are specified in Table 1 of Case N-770-1 or later - not IWB-2420. For example, Case N-770, paragraph -2420 states: "Successive examinations are performed in accordance with Table 1". Case N-766-3 never intended successive examinations to be performed in accordance with IWB-2420. In fact, Case N-766 requires the preservice baseline examination, preservice and inservice examinations to be performed in accordance with N-770-1 or later. This condition is incorrect and should be removed.

d. Proposed condition (4) prohibits acceptance of subsurface indications detected by eddy current testing in inlays/onlays during acceptance examinations.

   Appendix IV (Supplement 2) of ASME Section XI contains ECT qualification requirements for detection of flaws with maximum depths of 0.020". According to the technical basis document, PVP2012-78265, recent testing has demonstrated the ability of ECT to detect flaws as shallow as 0.012" deep. Therefore, ECT procedures qualified in accordance with N-766-3 and Appendix IV, Supplement 2 are capable of detecting small surface connected flaws in an inlay/onlay that do not exceed 1/16" in length and 0.020" in depth.

   To add robustness to the design, inlays/onlays must also be evaluated for fatigue crack growth considering a postulated surface connected flaw. The postulated initial flaw depth is 1/16 inch, is equivalent to approximately one layer of weld metal, and conservatively accounts for undetected flaws within the inlay or onlay. The flaw lengths are specified to be 360° for circumferential flaws and the width of the DMW plus any susceptible material for axial flaws. The fatigue evaluation must demonstrate that the flaw will not grow through the inlay/onlay for the remaining life of the plant, thereby, maintaining its function as a barrier between susceptible material and the reactor coolant.

   Weld inlays/onlays must be installed using weld filler metals that contain at least 28% chromium (e.g., ERNiCrFe-7A). Furthermore, the chromium content of each inlay/onlay layer credited in the design must contain at least 24% chromium. Because inlays/onlays are considered resistant to PWSCC, Case N-766-1 does not require performance of a PWSCC crack growth evaluation for postulated flaws along the inside diameter surface. While this is the case, the technical basis document, PVP2012-78265, does document the results of a generic PWSCC crack growth evaluation performed to demonstrate that a 0.020" deep x 0.120" long, inside diameter connected flaw would not grow through the inlay or onlay within a 10-year inservice inspection interval. The flaw size used in the PWSCC crack growth evaluation bounds the largest flaw that could be missed by ECT. The results of this analysis demonstrate that in the in the very unlikely case that PWSCC would become an active mechanism for crack growth within the resistant material, a surface

connected flaw, 0.020" deep, would not grow through the minimum required inlay/onlay thickness, 1/8", within an inspection interval of 10 years. See PVP2012-78265 for specific details.

2.3. N-847, Partial Excavation and Deposition of Weld Metal for Mitigation of Class 1 Items, Section XI, Division 1

a. Proposed condition (1) requires that, "Use of Code Case N-847 is limited to installation of full 360-degree excavation and weld repairs (EWR)"

ASME believes that there is insufficient technical basis for limiting the use of this case to full 360-degree excavation and weld repairs. Examination requirements for partial-arc EWR weld repairs are identical to those required for unmitigated welds. The partial-arc EWR does mitigate the area of the weld where a flaw has been located but still is examined as if no mitigation has been performed.

Furthermore, extensive testing, modeling and validation work was performed demonstrating the effectiveness of the partial arc EWR. Refer to the following for key publications documenting the body of this work.

- Michael Benson and Patrick Raynaud, "*Weld Residual Stress Analysis of Excavate and Weld Repair Mockup, Technical Letter Report*," U.S. NRC, September 2016 (ML16257A523).
- *WRTC: Technical Basis and Residual Stress Studies to Support the Excavate and Weld Repair Methodology for Mitigation of Stress Corrosion Cracking in Class 1 Butt Welds*. EPRI, Palo Alto, CA: 2016. 3002007901.
- *MRP: Study of New Mitigation Technique Effects on Nondestructive Evaluation Inspectability*. EPRI, Palo Alto, CA: 2015. 3002005511.
- Steven McCracken, Jonathan Tatman and Pete Riccardella, "*Technical Basis for Code Case N-847 – Excavate and Weld Repair (EWR) for SCC Mitigation*," PVP2016-63769, Proc. ASME 2016 PVP Division Conference, Vancouver, BC, Canada.
- Francis Ku, Pete Riccardella and Steve McCracken, "*3D Residual Stress Simulation of an Excavate and Weld Repair Mockup*," PVP2016-63815, Proc. ASME 2016 PVP Division Conference, Vancouver, BC, Canada.
- Mitchell Olson, Adrian DeWald, Michael Hill and Steve McCracken, "*Residual Stress Mapping for an Excavate and Weld Repair Mockup*," PVP2016-63197, Proc. ASME 2016 PVP Division Conference, Vancouver, BC, Canada.

b. Proposed Condition (2) specifies the intersection points in Figure 1A and Figure 1B at the interface between the EWR metal and existing base metal be rounded. This condition is assumed to imply a radius is necessary at the bottom corners of the EWR excavation. Figures 1A and 1B are not intended to specify weld joint or excavation details. Weld joint details, such as a corner

radius requirement, are addressed in weld detail drawings or the WPS. Though not burdensome, the ASME recommends this condition be removed since it is not necessary.

c. Proposed Condition (3) states that the 2(d)(2) evaluation must include crack growth in the Alloy 690 weld material, including the dilution zone. Since this condition applies to nickel base dissimilar metal EWRs, the correct subparagraph should likely be 2(d)(1) not 2(d)(2).

   The ASME believes Condition 3 should be removed. The intent of 2(d)(1) is to demonstrate by analysis that a crack in the original SCC susceptible nickel alloy groove weld will arrest at the "axial overlap" below the new SCC-resistant (≥ 24% Cr) EWR weld metal (see Figure 1A). The implied requirement is to design the EWR axial overlap with sufficient length to arrest an existing crack or potential crack in the remnant SCC-susceptible groove weld. It is important to note that the 1st layer dilution zones in full penetration groove welds using high Cr Ni-base weld metals such as 52i, 52M or 52MSS (Alloy 690 weld metal variants) for new construction or new replacement groove welds are considered resistant to PWSCC in a PWR environment. This PWSCC resistance in similar dilution zones is no different for a new EWR or WOL installed with high Cr Ni-base weld metal.

2.4. N-864, Reactor Vessel Threads in Flange Examinations, Section XI, Division 1

ASME provides the following comments on the conditions proposed in Table 2:

a. Proposed condition (1) will require licensees to perform examinations required by ASME Section XI, Examination Category B-G-1, Item No. B6.40 every third inspection interval. The NRC explains in this proposed condition that "Facilities that received NRC approval for an alternative under 10 CFR 50.55a(z) that authorized the licensee not to perform the examinations on Item No. B6.40 before Code Case N-864 was incorporated into NRC regulations are not permitted to apply Code Case N-864 in a manner that would result in the examinations on Item No. B6.40 not being performed in more than two consecutive ISI intervals."

   ASME believes that this proposed condition is unnecessary because the flaw tolerance evaluation that supported this case determined that the potential for crack growth in flange threads is insignificant, and that a flaw in the flange threads would not grow to an unacceptable size and would not challenge the integrity of the component for at least 80 years. ASME also believes that the NRC's stated reason for proposing this condition, which is based on approved requests from licensees using 10 CFR 50.55a(z), is not technical. ASME requests that the NRC consider deleting the proposed condition or provide a technical basis for the proposed condition.

b. Proposed condition (2) requires that "Monitoring and maintenance activities must be performed and documented to monitor the condition of the reactor pressure vessel threads in flange for signs of degradation and to mitigate any degradation that occurs."

ASME believes that this proposed condition is not clear enough to be implemented consistently by licensees. In addition, activities performed in accordance with licensees' maintenance procedures are deemed sufficient to identify and monitor adverse conditions that may be detected during these activities. For these reasons, ASME believes that this condition is unnecessary and recommends that the NRC consider deleting the condition in Regulatory Guide 1.147, Revision 20.

2.5. N-876, Austenitic Stainless Steel Cladding and Nickel Base Cladding Using Ambient Temperature Automatic or Machine Dry Underwater Laser Beam Welding (ULBW) Temper Bead Technique, Section XI, Division 1

ASME revised IWA-4661 in the 2013 Edition to change the criteria for weldability to helium content rather than thermal neutron fluence. Prior to the 2013 Edition IWA-4661 restricted underwater welding to material with predicted thermal neutron fluence not to exceed 1017 neutrons per cm2. Although this terminology is appropriate for underwater welding in BWR's, it is not necessarily appropriate for PWR's, where fast neutron flux has more of an effect on helium generation. BWR-VIP-97 identifies predicted helium content (Helium is produced due to the interaction of thermal neutrons with boron and nickel in irradiated stainless steel) rather than predicted fluence as the criteria upon which weldability of irradiated materials should be based.

ASME believes that this condition should be removed and that the NRC should consider removing conditions currently specified in 10 CFR 50.55a(b)(2)(xii) during the next §50.55a rulemaking.

2.6. N-878, Alternative to QA Program Requirements of IWA-4142 Section XI, Division 1

a. Proposed condition (1) requires that "For ASME Section III items, the Licensee must verify the design and testing activities associated with qualification of non-welded fittings performed by the fabricator as follows:

(a) Review the fabricator's design documentation and methods to ensure the fittings design is in compliance with the Licensee's design specifications, and ASME Section III NB/NC/ND-3671.7 requirements; and either

(i) Supervise and monitor the performance qualification tests of the fittings to ensure the design is in compliance with the Licensee's design specifications and ASME Section III NB/NC/ND-3671.7; or

(ii) The Licensee or Repair/Replacement Organization conducts qualification tests of the fittings or conducts design analyses to ensure the design is in compliance with the Licensee's design specifications and ASME Section III NB/NC/ND-3671.7."

ASME provides the following comments on this proposed condition:

1. This condition should be clarified that it is only imposed on a licensee when the original construction code was Section III. If a licensee procures a Section III small fitting for a plant that is not originally constructed to Section III, this condition should not apply as the licensee's QA Program

would govern the applicable procurement requirements for the item.

2. This case requires the Owner to approve the Repair/Replacement Organization's (RRO) QA Program [IWA-4142(a)(2)]. This approval should be sufficient to ensure that the RRO's design documentation and methods comply with the Licensee's design specifications, as well as ASME Section III NB/NC/ND-3671.7 requirements.
3. This case requires that records of all examinations or testing be included with the Certified Material Test Report or Certificate of Compliance, which shall be reviewed and accepted by the Owner.

b. Proposed condition (2) is unnecessary because this case requires that the Owner make records available to the ANII prior to installation of an item using this case, and the ANII would always have the opportunity to review the design report as well. Owners are required to make all records available to the ANII.

For reasons described above, ASME recommends that the proposed conditions (1) and (2) be removed from Regulatory Guide 1.147, Revision 20 Table 2 and approval of this case be documented in Table 1. If these conditions are not removed, then ASME requests that the NRC address Comment 1 above.

2.7. N-880, Alternative to Procurement Requirements of IWA-4143 for Small Nonstandard Welded Fittings, Section XI, Division 1

Please refer to the ASME comments provided for Code Case N-878, which also apply to this case.

Note that Footnote (1) of this case references Section III, NB/NC/ND-3671.7 for the design and testing requirements for the fittings, so these requirements are imposed by this case.

ASME recommends that the proposed conditions (1) and (2) be removed from Regulatory Guide 1.147, Revision 20 Table 2 and approval of this case be documented in Table 1. If these conditions are not removed, then ASME requests that the NRC address Comment 1 provided for Code Case N-878, which also applies to N-880.

Enclosure 3

ASME Comments on Draft Regulatory Guide DG-1369, ASME Code Cases Not Approved for Use

1. Comments on proposed Regulatory Guide 1.193, Revision 7, Table 2.

1.1. N-826, Ultrasonic Examination of Full Penetration Vessel Weld Joints in Fig. IWB-2500-1 Through Fig. IWB-2500-6

ASME recognizes that initial disapproval of Code Case N-826 occurred in a prior revision to Regulatory Guide 1.193. However, ASME provides the following comments on the basis for disapproval in Table 2:

a. ASME Section XI Code Case N-826 provides for the reduction of the volumetric examination volume in Figures IWB-2500-1 through IWB-2500-6 from 1/2T on either side of the weld to ½". Regulatory Guide 1.193 identifies the following basis for not allowing the use of Section XI Code Case N-826:

> "Reduction of the inspection volume from ½ t to ½ inch conflicts with 10 CFR 50.61a, "Alternate Fracture Toughness Requirements for Protection against Pressurized Thermal Shock Events." Licensees implementing 10 CFR 50.61a must first examine the volume described in Section XI, Figures IWB-2500-1 and IWB-2500-2, using Appendix VIII-qualified procedures, equipment, and personnel to obtain the necessary data on flaws to ensure that the flaw density requirements of 10 CFR 50.61a are met. Although, under Code Case N-826, a licensee would have examined the full ½-t volume at least once in accordance with Appendix VIII, the NRC staff finds it unacceptable to allow reduction of the examination volume for later inservice examinations because of concerns about detection and sizing accuracy for smaller flaws using the current UT technology. Current UT technology cannot reliably detect and accurately size smaller flaws, which affects the validity of the comparison with the flaw density requirement of 10 CFR 50.61a. In addition, recent experiences at operating plants involving missed defects during examinations that used qualified methods and were conducted in compliance with Section XI, Appendix VIII, have raised concerns about the reliability of ultrasonic examinations. Finally, the reduction from ½ t to ½ inch originated with Code Case N-613. The purpose of the reduction in examination volume was to reduce the number of relief requests caused by the inability to examine the required volume for typical geometries of nozzle-to-vessel welds. The full-penetration vessel welds addressed by Code Case N-826 do not generally have similar geometric restrictions that would prevent an examination of the full ½-t volume."

In summary, Code Case N-826 is not allowed to be used based on three main points:

1. Potential conflict with ability to meet requirements of 10 CFR 50.61a
2. Recent experience with missed defects during UT examinations
3. Lack of a hardship for fulfilling existing examination volume requirement

These three points do not constitute a sound technical basis for not approving the use of Code Case N-826, and ASME recommends that the NRC take action

to remove Code Case N-826 from Regulatory Guide 1.193 and approve the use of this case in Regulatory Guide 1.147 for reasons explained in items b through d below.

b. 10 CFR 50.61a is an optional rule that is only applicable to PWRs. As of this date, only one plant has been approved to use 10 CFR 50.61a, and that plant is scheduled to shut down in 2022. The remainder of the PWR fleet and the entire BWR fleet could still benefit from the use of this Code Case while not having any conflict with the requirements of 10 CFR 50.61a. In addition, use of 10 CFR 50.61a requires NRC approval prior to its use. Therefore, to address the concern of a potential conflict, it seems that it would be more prudent for the NRC to condition use of the Code Case such that it is not allowed for use for plants that adopt 10 CFR 50.61a rather than disallowing use for the entire PWR and BWR fleet.

c. ASME is not aware of the specific event(s) that the NRC is referring to with regards to their concerns about missed defects during UT examinations. It would be helpful if the NRC could provide the specifics related to their concern. ASME surmises that this concern may stem from an event involving the examination of nickel-based alloy, dissimilar metal welds. Those welds would have been inspected using IWB-2500 figures (and the associated examination volumes) that are not within the scope of this Code Case. Furthermore, there has been no similar experience regarding missed defects during examination of the low alloy steel similar metal welds that are within the scope of this Code Case. In particular, data from the Performance Demonstration Initiative (PDI) have shown that the probability of detection for flaws in welds within the scope of Code Case N-826 is very high (i.e., greater than 90%) as shown in Figures 2-1 through 2-3 of EPRI Report 3002013319 (Reference 1).

d. Code Cases are not intended to solely address hardships. Many Code Cases have been written and approved for use by licensees that provide an alternative approach to the existing Code requirements for the purposes of efficiency, simplicity, reduced costs, and ALARA concerns. The Code Case approval process requires that all actions have a sufficiently robust technical basis for the proposed alternative, but demonstration of a hardship is not required. The technical basis for Code Case N-826 is consistent with the technical basis for Code Case N-613, which has been approved for use by the NRC. This technical basis points to the fact that flaws, if they should exist, are typically in close proximity to the weld fusion line. As such, an examination volume of ½" on either side of the weld would be sufficient to identify any flaws of significance. This conclusion is supported by service experience and the extensive research on reactor vessel flaw conditions that was conducted and documented in NUREG/CR-6817 (Reference 2). The NRC's approval of the use of Code Case N-613 is indicative of the Staff's approval of the underlying technical basis. If the technical basis is acceptable for Code Case N-613, it should be equally acceptable for Code Case N-826.

e. References

1. *Nondestructive Evaluation: Probabilistic Analysis of Performance Demonstration Ultrasonic Flaw Detection and Through-Wall Sizing Results for Reactor Pressure Vessel Inspections* (Revision 2). EPRI, Palo Alto, CA: 2018. 3002013319 (Available for download from EPRI.com).
2. F.A. Simonen, S.R. Doctor, G.J. Schuster, and P.G. Heasler, "*A Generalized Procedure for Generating Flaw-Related Inputs for the FAVOR Code*," NUREG/CR-6817, Rev. 1, U.S. Nuclear Regulatory Commission, August 2013 (ADAMS Accession No. ML13240A258).