



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

February 9, 2026

**PALISADES NUCLEAR PLANT – AUTHORIZATION AND SAFETY EVALUATION FOR
ALTERNATIVE REQUEST RR 5-11 (EPID: L-2025-LLR-0079)**

LICENSEE INFORMATION

Recipient's Name and Address: Site Vice President
Palisades Energy, LLC
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

Licensee: Holtec Palisades, LLC

Plant Name and Unit: Palisades Nuclear Plant

Docket No.: 50-255

APPLICATION INFORMATION

Submittal Date: August 20, 2025

Submittal Agencywide Documents Access and Management System (ADAMS) Accession No.: ML25232A168

Supplement Dates: December 19, 2025, December 30, 2025, and February 2, 2026

Supplement ADAMS Accession Nos.: ML25353A329, ML25364A158 and ML26033A149

Applicable Inservice Inspection (ISI) Program Interval and Interval Start/End Dates: The fifth ISI interval began on December 13, 2015, and is scheduled to end on August 12, 2029, upon recovery of shutdown time per the ASME Code.

Alternative Provision: The licensee requested an alternative under Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1).

ISI Requirement: The American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements applicable to this request originate in IWA-4000.

- Paragraph IWA-4421 states, in part, that defects shall be removed or mitigated.
- Paragraph IWA-4422.1(a) states, in part, that a defect is considered removed when it has been reduced to an acceptable size.
- Paragraph IWA-4422.1(b) states, in part, that alternatively, the defect removal area and any remaining portion of the defect may be evaluated, and the component accepted in accordance with the appropriate flaw evaluation provisions of Section XI.

ASME Code Case N-853-1, "PWR Class 1 Primary Piping Alloy 600 Full Penetration Branch Connection Weld Metal Buildup for Material Susceptible to Primary Water Stress Corrosion Cracking, Section XI, Division 1," provides an alternative to the defect removal requirements of ASME Code, Section XI, IWA-4000. This code case has been incorporated by reference into 10 CFR 50.55a via inclusion in Regulatory Guide (RG) 1.147, Revision 21, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," with conditions.

- Paragraph 2(d) states, in part, that the weld between the replacement nozzle and the weld pad shall be a partial penetration weld. Design, fabrication, and installation of the replacement nozzle and weld shall be in accordance with the Construction Code.
- Paragraph 3(d)(3) requires that the volumetric examinations of the weld pad deposit and the ferritic heat-affected zone beneath the weld deposit are conducted no sooner than 48 hours following completion of the three tempering layers when ambient temperature temper bead welding is performed.
- Paragraph 3(d)(3) requires that the acceptance criteria of ASME Code, Section III, NB-5330 is applied to the volumetric acceptance examinations of the weld pad deposit and the ferritic heat-affected zone beneath the weld deposit.
- Paragraph 4 requires that the preservice inspection (PSI) includes the visual examinations of the weld pad deposit, the partial penetration weld attaching the new branch connection nozzle, and the ½-inch of the adjacent materials.
- Paragraph 5 requires that the ISI includes the visual examinations of the weld pad deposit, the partial penetration weld attaching the new branch connection nozzle, and the ½-inch of the adjacent materials during the first or second refueling outage following implementation.

ASME Code, Section III, NB-3661.3 states, in part, that fillet welds and partial penetration welds are allowed for branch connections provided the branch connection shall not be larger than nominal pipe size (NPS) 2.

ASME 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." This code case is mandated by 10 CFR 50.55a(g)(6)(ii)(F) with conditions.

- ASME Code Case N-770-5, paragraph -1210(b) states, in part, that the examination requirements shall apply to the following Class 1 piping butt welds fabricated with Alloy 82/182 materials and mitigated with full structural weld overlay, optimized weld overlay, inlay, or onlay with either, or any combination of weld filler materials UNS N06052 (SFA-5.14, ERNiCrFe-7), UNS W86152 (SFA-5.11, ENiCrFe-7), or UNS N06054 (SFA-5.14, ERNiCrFe-7A). These individual filler materials or any combination thereof will be hereinafter referred to as Alloy 52/152.

Applicable Code Edition and Addenda: The Palisades code of record for the fifth ISI interval is the 2007 Edition with 2008 addenda of the ASME Code, Section XI.

The Palisades original construction code for the primary coolant system (PCS) piping was the 1955 Edition of the American Standards Association (ASA) B31.1 and the 1955 Edition through

Winter 1966 Addenda of the ASME Code, Section III. Palisades has adopted the 2019 Edition of the ASME Code, Section III for all items under Subsection NB.

Brief Description of the Proposed Alternative: The components affected include:

- One PCS piping hot leg (HL) drain/long term cooling branch connection nozzle and full penetration dissimilar metal (DM) weld with NPS 2.
- Two PCS piping cold leg (CL) charging inlet branch connection nozzles and full penetration DM welds with NPS 2.
- Two PCS piping CL spray outlet branch connection nozzles and full penetration DM welds with NPS 3.

The material of construction of the PCS piping is SA-516, Grade 70 (P-No. 1). The nozzles are made of Alloy 600, and the DM welds are Alloy 182. Alloy 600/182 is susceptible to primary water stress corrosion cracking (PWSCC).

The licensee stated that it will proactively mitigate the branch connections that have Alloy 600 nozzles and Alloy 182 DM attachment welds in the HL and CL piping in accordance with ASME Code Case N-853-1, with certain alternatives to the requirements of N-853-1 as listed below. The mitigation, shown in Figures 8-1 and 8-2 of RR-11, will be performed by (a) removing part of the existing Alloy 600 nozzle, (b) installing Alloy 52MSS welded reinforcing pad, or weld pad, on the outside diameter of HL and CL piping at the location of the remnant of existing Alloy 600/182 DM weld, and (c) attaching the replacement Alloy 690 nozzle to Alloy 52MSS weld pad by either a partial penetration or a full penetration Alloy 52MSS weld filler material as applicable.

The licensee's proposed alternatives to certain requirements of ASME Code Case N-853-1 are as follows:

- The licensee proposed to use Alloy 52MSS weld filler material for the weld pad deposit and the replacement nozzle attachment weld. The licensee stated that ASME Code Case N-770-5, paragraph -1210(b) does not include Alloy 52MSS as one of the mitigative weld filler materials.
- The licensee proposed to attach the PCS piping CL spray outlet NPS 3 replacement nozzle to the weld pad with Alloy 52MSS weld filler material using full penetration non-tempered bead welding in lieu of the requirement in ASME Code Case N-853-1, paragraph 2(d).
- The licensee proposed to perform the surface and volumetric acceptance examinations of the weld pads sooner than the required 48-hour hold time following completion of the three tempering layers in lieu of the requirement in ASME Code Case N-853-1, paragraph 3(d)(3).
- For volumetric acceptance examination of the weld pad, the licensee proposed to use the ASME Code, Section XI, IWB-3514 acceptance criteria in lieu of ASME Code, Section III, NB-5330 as required by ASME Code Case N-853-1, paragraph 3(d)(3).
- For PSI, the licensee proposed to use manual linear phased-array ultrasonic testing in accordance with ASME Code Case N-770-5, Inspection Item F-1, in lieu of the ASME Code Case N-853-1, paragraph 4 required bare metal VE visual examination.

For additional details on Alternative Request RR 5-11, please refer to the documents located at the ADAMS Accession Nos. identified above.

STAFF EVALUATION

The U.S. Nuclear Regulatory Commission (NRC) staff evaluated Alternative Request RR 5-11 pursuant to 10 CFR 50.55a(z)(1) to determine whether the proposed alternatives provide an acceptable level of quality and safety. The licensee proposes to utilize ASME Code Case N-853-1 to mitigate the subject PWSCC susceptible DM butt welds, with the proposed alternatives listed above. The NRC has approved the general use of ASME Code Case N-853-1 in Revision 21 of NRC RG 1.147 as an alternative to the requirements of Article IWA-4000, "Repair/Replacement Activities," of Section XI of the ASME Code. Therefore, the NRC staff focused its review on evaluating the licensee's technical bases for its proposed alternatives to ASME Code Case N-853-1 as follows:

Alloy 52MSS Weld Filler Material

The licensee stated that it will utilize Alloy 52MSS weld filler material to deposit the weld pad and attach the Alloy 690 nozzle to the weld pad. Alloy 52 and its variants are nickel-based weld filler materials with high chromium content (greater than 28 percent) developed to match the stress corrosion cracking (SCC) performance of Alloy 690 material. While the Alloy 52 weld filler material has shown to be resistant to PWSCC, its weldability issue (e.g., solidification cracking and ductility dip cracking (DDC)) has prompted further development of its variants. Alloy 52M filler metal was later introduced with optimized trace element controls and minor composition shifts to reduce susceptibility to DDC, especially in multi-pass welding over stainless steel base materials. Subsequently, the development of Alloy 52MSS has further improved weldability by adjusting elements such as niobium, tantalum, and molybdenum contents. The core design principle across all these Alloy 52 variants remains the retention of high chromium content to ensure resistance to SCC. The NRC staff finds that the use of Alloy 52MSS filler metal for the Palisades weld pads and nozzle attachment welds is acceptable because Alloy 52MSS meets or exceeds the required chromium content (greater than 28 percent) necessary to ensure the installed welds are PWSCC-resistant in the reactor coolant environment.

Full Penetration Non-Tempered Bead Welding for PCS Piping CL Spray Outlet NPS 3

The licensee stated that a full penetration, non-tempered bead nozzle corner weld will be used to attach the replacement Alloy 690 CL spray outlet nozzles to weld pads because the replacement Alloy 690 CL spray outlet nozzles are NPS 3, and the Construction Code or ASME Code, Section III, NB-3661.3 does not allow partial penetration welds for the nozzle larger than NPS 2. The NRC staff finds the use of a full penetration weld in lieu of a partial penetration weld for the replacement Alloy 690 CL spray outlet nozzles complies with the ASME Code, Section III, NB-3661.3 or the Construction Code requirement, and therefore, is acceptable.

Acceptance Examinations of Weld Pad Without the 48-Hour Hold Time

The licensee stated that the weld pad for the replacement nozzle will be deposited using the ambient temperature temper bead welding technique. The acceptance examinations of the weld pad will be performed sooner than 48 hours following completion of the three tempering layers in lieu of the ASME Code Case N-853-1 imposed requirement of a 48-hour delay between welding completion and final acceptance examination. As the technical basis for this proposed alternative, the licensee provided the industry white paper stating that the reason for performing the final nondestructive examination (NDE) after the 48-hour delay is the recognition that alloy steels can become susceptible to hydrogen-induced cracking (HIC) or hydrogen-delayed

cracking. HIC can occur immediately during cooling to ambient temperature or up to 48 hours after reaching ambient temperature. The white paper discussed the driving factors such as microstructure, sources for hydrogen introduction, and diffusivity and solubility of hydrogen. However, deployment of the ambient temperature temper bead welding technique for performing repairs on carbon and low alloy steel (P-No. 1 and P-No. 3) materials using austenitic filler materials has been highly successful for many years with no evidence of HIC detected by NDE. During the past 20 years, many temper bead weld overlay repairs were successfully performed on boiling water reactors and PWRs using ambient temperature temper bead welding technique. The operating experience has shown that with hundreds of ambient temperature temper bead applications, there has not been any reported occurrence of HIC.

Based on information provided in the white paper, the NRC staff finds that it is reasonable to conclude that eliminating the 48-hour hold at ambient temperature after the completion of the three tempering layers and prior to performing the final weld acceptance NDE is acceptable because any HIC, were it to occur, is expected to occur following completion of the third temper bead weld layer. Therefore, the NRC staff concludes that NDE of the weld pad after completion of the third temper bead weld layer is acceptable.

Acceptance Criteria of IWB-3514 for Acceptance Examination and PSI of Weld Pad

The NRC staff notes that guidance in ASME Code Case N-853-1 requires the use of ASME Code, Section III, NB-5330 acceptance criteria for volumetric acceptance examination of a weld pad to assure that no planar welding fabrication defects, regardless of length or depth left in service, will grow to compromise the structural integrity of the weld pad, and eventually the reactor coolant pressure boundary. Therefore, the PSI and subsequent ISI of the weld pads under this code case are only a visual examination. In precedents (e.g., ML070850915 and ML071280781, respectively), where alternatives approved by the NRC have allowed use of ASME Code, Section XI, IWB-3514 criteria instead of Section III, NB-5330 for similar applications (e.g., weld overlay or weld pad), the subsequent ISI of the location would be a volumetric not a visual examination. The volumetric examination is to ensure any planar welding fabrication defects left in service under IWB-3514 would be monitored periodically to confirm dormancy, and maintain the structural integrity of the components.

The licensee stated that the acceptance examination of the weld pad was performed by ultrasonic testing (UT) in accordance with ASME Code Case N-853-1, with the exception of using IWB-3514 criteria instead of the required NB-5330 for flaw disposition. In Figure 8-4 of R-11, the licensee provided the extent of volume examined. In the supplemental letters dated December 19 and 30, 2025, the licensee stated that its UT procedure met the demonstration requirements of the ASME Code, Section V, employed technical elements of the performance demonstration initiative (PDI) qualified ASME Code, Section XI, Supplement 11 procedures, and was implemented by PDI-qualified Supplement 11 weld overlay examiners.

In the supplemental letters dated December 19 and 30, 2025, the licensee stated that:

- It will implement the requirement of ASME Code Case N-770-5, Table 1, Note 6(b), which states, in part, "... if the volumetric examination prior to the full structural weld overlay is not performed, it shall be assumed to be cracked and shall be classified F-1."
- For PSI, the volumetric examination and acceptance criteria ASME Code Case N-770-5, Inspection Item F-1, will be implemented.

- The PSI volumetric examination will be performed prior to drilling the weld buildup for the replacement nozzle; therefore, there will not be any examination coverage limitations due to the replacement nozzle and the partial penetration attachment weld.
- The extent of PSI examination volume is described in Figure 8-5 of the December 19 and 30, 2025, supplemental letters.
- The proposed alternative for ISI examination requirements will be removed from R-11 and will be addressed in a subsequent alternative submittal later.

The NRC staff determined that use of the IWB-3514 criteria for the acceptance examination is acceptable because (a) these mitigated PCS HL and CL branch connection piping nozzle DM welds will be subjected to PSI volumetric examination in accordance with ASME Code Case N-770-5, Inspection Item F-1, and (b) the location and vicinity of the planar fabrication defects left in service under IWB-3514 will receive subsequent ISI volumetric examinations to ensure no crack growth or new cracking would compromise the structural integrity of the weld pad and its associated repaired nozzle components. Use of ASME Code Case N-770-5 for the subject branch connections piping nozzle DM welds is consistent with NRC Regulatory Issue Summary 2015-10, "Applicability of ASME Code Case N-770-1 as Conditioned in 10 CFR 50.55a, "Codes and Standards," to Branch Connection Butt Welds."

In summary, the NRC staff finds that the above proposed alternatives provide reasonable assurance of structural integrity and leak tightness of the subject mitigated PCS HL and CL piping branch connection nozzles and associated DM welds.

CONCLUSION

As set forth above, the NRC staff determines that the licensee's alternative request above provides an acceptable level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of Alternative Request RR 5-11 at Palisades for the remainder of the fifth ISI interval, which is scheduled to end on August 12, 2029, upon recovery of shutdown time per the ASME Code.

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

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Date: February 9, 2026

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**PALISADES NUCLEAR PLANT – AUTHORIZATION AND SAFETY EVALUATION FOR
ALTERNATIVE REQUEST RR 5-11 (EPID: L-2025-LLR-0079) DATED FEBRUARY 9, 2026**

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