



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

February 1, 2016

Vice President, Operations  
Entergy Nuclear Operations, Inc.  
Palisades Nuclear Plant  
27780 Blue Star Memorial Highway  
Covert, MI 49043-9530

SUBJECT: PALISADES NUCLEAR PLANT – RELIEF REQUEST NUMBER RR 4-23 –  
PROPOSED ALTERNATIVE CONCERNING ASME CODE DEPTH SIZING  
REQUIREMENT (CAC NO. MF6727)

Dear Sir or Madam:

By letter dated September 16, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15260A371), Entergy Nuclear Operations, Inc. (ENO, the licensee), submitted Relief Request No. RR 4-23, which proposes to use an alternative inspection procedure to perform inspections required by Title 10 of the *Code of Federal Regulations*, Part 50 (10 CFR 50) Paragraph 55a(g)(6)(ii)(F) at the Palisades Nuclear Plant (PNP). These inspections are related to the ultrasonic examination of nickel-based Alloy 82/182 dissimilar metal butt welds joining Alloy 600 branch connections to one hot leg and eight cold leg pipes. The proposed alternative inspection procedure does not meet the 0.125 inch root mean square (RMS) error depth sizing requirements of American Society of Mechanical Engineers (ASME) Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds" and ASME Code Section XI, Appendix VIII, Supplement 10, "Qualification Requirements for Dissimilar Metal Piping Welds."

Specifically, pursuant to 10 CFR 50.55a(z)(1), the licensee proposes using an inspection procedure with an alternative depth sizing RMS error of 0.242 inches on the basis that the proposed inspection procedure provides an acceptable level of quality and safety.

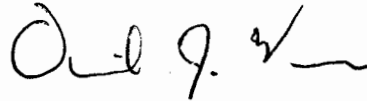
The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the proposed RMS error in the inspection procedure is acceptable, that the proposed alternative provides reasonable assurance that the structural integrity of the branch connections to the hot leg and cold leg piping will be adequately monitored to the end of the fourth ISI interval, and that the proposed alternative 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, during a conference call on September 17, 2015 (ADAMS Accession No. ML15261A039), the NRC staff verbally authorized the use of the licensee's proposed alternative at PNP, effective for the remainder of the fourth 10-year interval, which began on December 13, 2006, and ended on December 12, 2015.

The NRC staff notes that all other ASME Code, Section XI and 10 CFR 55a(g)(6)(ii)(F) requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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If you have any questions, please contact the Palisades Project Manager, Jennivine Rankin, at (301) 415-1530.

Sincerely,

A handwritten signature in black ink, appearing to read "David J. Wrona". The signature is written in a cursive style with a prominent initial "D" and a checkmark-like flourish at the end.

David J. Wrona, Chief  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure:  
Staff Evaluation of the Fourth 10-Year  
Interval Relief Request RR 4-23

cc w/encl: Distribution via Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR RELIEF REQUEST 4-23

PROPOSED ALTERNATIVE CONCERNING ASME CODE DEPTH SIZING REQUIREMENT

PALISADES NUCLEAR PLANT

ENTERGY NUCLEAR OPERATIONS, INC

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated September 16, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15260A371), Entergy Nuclear Operations, Inc. (ENO, the licensee), submitted Relief Request No. RR 4-23, which proposes to use an alternative inspection procedure to perform inspections required by Title 10 of the *Code of Federal Regulations*, Part 50 (10 CFR 50) Paragraph 55a(g)(6)(ii)(F) at the Palisades Nuclear Plant (PNP). These inspections are related to the ultrasonic examination of nickel-based Alloy 82/182 dissimilar metal butt welds joining Alloy 600 branch connections to one hot leg and eight cold leg pipes. The proposed alternative inspection procedure does not meet the 0.125 inch root mean square (RMS) error depth sizing requirements of American Society of Mechanical Engineers (ASME) Code Case N-695, "Qualification Requirements for Dissimilar Metal Piping Welds" and ASME Code Section XI, Appendix VIII, Supplement 10, "Qualification Requirements for Dissimilar Metal Piping Welds."

Specifically, pursuant to 10 CFR 50.55a(z)(1), the licensee proposes using an inspection procedure with an alternative depth sizing RMS error of 0.242 inches on the basis that the proposed inspection procedure provides an acceptable level of quality and safety. During a conference call on September 17, 2015 (ADAMS Accession No. ML15261A039), the U.S. Nuclear Regulatory Commission (NRC) staff verbally authorized the use of the proposed alternative at PNP, effective for the remainder of the fourth 10-year interval, which began on December 13, 2006, and ended on December 12, 2015.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. However, 10 CFR 50.55a(z) states, in part, that alternatives to the requirements of paragraph (g) may be

Enclosure

used, when authorized by the NRC, if the licensee demonstrates that (1) the proposed alternatives would provide an acceptable level of quality and safety, or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on analysis of the regulatory requirements, the NRC staff concludes that regulatory authority exists to authorize the proposed alternative pursuant to 10 CFR 50.55a(z)(1).

### 3.0 TECHNICAL EVALUATION

#### 3.1 The Licensee's Relief Request

##### Components Affected

The licensee's request includes nine butt welds joining branch connections to pipes. Table 1 provides additional information regarding the branch connections and welds. The welds are Class 1 Pressurized Water Reactor (PWR) pressure retaining Dissimilar Metal Piping and Vessel Nozzle Butt Welds containing Alloy 82/182. One Hot leg weld is covered under ASME 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 W86182 Weld Filler Material With or Without Application of Listed Mitigation Activities Section XI, Division 1," Inspection Item A-2 "Unmitigated butt weld at Hot Leg operating temperature (-2410) ≤ 625°F (329°C)." The eight cold leg welds are covered under ASME Code Case N-770-1, Inspection Item B, "Unmitigated butt weld at Cold Leg operating temperature (-2410) ≥ 525°F (274°C) and < 580°F (304°C)."

Table 1: Branch Connections Covered in RR 4-23

<b>Branch Connection Description</b>	<b>Weld Identification</b>	<b>Weld Location</b>
2 inch Cold Leg Charging Nozzle	PCS-30-RCL-1A-11/2	P-50A Discharge Leg
2 inch Cold Leg Drain Nozzle	PCS-30-RCL-1A-5/2	P-50A Suction Leg
3 inch Cold Leg Pressurizer Spray Nozzle	PCS-30-RCL-1B-10/3	P-50B Discharge Leg
2 inch Cold Leg Drain Nozzle	PCS-30-RCL-1B-5/2	P-50B Suction Leg
2 inch Cold Leg Charging Nozzle	PCS-30-RCL-2A-11/2	P-50C Discharge Leg
3 inch Cold Leg Pressurizer Spray Nozzle	PCS-30-RCL-2A-11/3	P-50C Discharge Leg
2 inch Cold Leg Drain Nozzle	PCS-30-RCL-2A-5/2	P-50C Suction Leg
2 inch Cold Leg Drain and Letdown Nozzle	PCS-30-RCL-2B-5/2	P-50D Suction Leg
2 inch Hot Leg Drain Nozzle	PCS-42-RCL-1H-3/2	A Hot Leg

##### Code of Record

The applicable code is the ASME Section XI, 2001 Edition through 2003 Addenda as amended by 10 CFR 50.55a for the fourth interval.

##### Code Requirements

With the issuance of a revised 10 CFR 50.55a in June 2011, the NRC staff incorporated, by

reference, Code Case N-770-1. Specific implementing requirements are documented in 10 CFR 50.55a(g)(6)(ii)(F).

### Reason for Relief Request

By letter dated September 16, 2015, the licensee provided the following reason for the proposed alternative:

ENO will be performing volumetric examinations of the subject welds during the current refueling outage, and will implement the requirements of ASME Section XI, Code Case N-695. Code Case N-695, Section 3.3(c), requires that qualified procedures, equipment, and personnel shall demonstrate a flaw depth-sizing error less than or equal to 0.125 inch [RMS].

To date, no known inspection vendor for primary coolant system branch connection configurations has met the RMS error requirement.

The licensee further explained that the examination vendor has achieved RMS error of 0.242 inch instead of the required 0.125 inch RMS error. In addition, the inspection procedure and personnel were qualified for detection and length sizing on the subject welds.

### Proposed Alternative and Basis for Use

By letter dated September 16, 2015, the licensee proposes to use the following alternative for flaw depth sizing when the subject dissimilar metal welds are examined from the outside surface:

Examinations shall be performed using ultrasonic techniques that are qualified for flaw detection and length sizing using procedures, personnel and equipment qualified by demonstration in all aspects except depth sizing. The 0.242 inch RMSE [root mean square error] will be used for depth sizing, in lieu of the ASME Code required 0.125 inch RMSE, which does not exceed ten percent of the material wall thickness (consistent with EPRI [Electric Power Research Institute] Policy/Procedure 03-01), and as such will provide an acceptable level of quality and safety.

All other ASME Code, Section XI, requirements for which relief has not been specifically requested applies, including the third party review by the Authorized Nuclear Inservice Inspector.

### Duration of Proposed Alternative

The proposed alternative to the ASME Code is applicable for the remainder of the fourth 10-year interval, which began on December 13, 2006, and ended on December 12, 2015.

### 3.2 Staff Evaluation

The licensee used NRC-approved Code Case N-695 to satisfy the requirements of ASME Code, Section XI, Appendix VIII. Code Cases N-695 requires that procedures used to inspect welds

be qualified by performance demonstration. The acceptance criterion in Code Case N-695 specifies that the RMS error of the examination procedures shall not be greater than 0.125 inches. The licensee's inspection vendor was able to depth size with an RMS error of 0.242 inches. The licensee is requesting relief from the 0.125 inch depth sizing requirement in ASME Code Case N-695 in accordance with 10 CFR 50.55a(z)(1).

The specific Code Case N-695 requirement for which relief is requested pertains to the depth sizing qualification requirements for performance demonstration of ultrasonic examination systems for dissimilar metal piping welds. Code Case N-695, Section 3.3, "Depth-Sizing Test," states the following: "(c) Examination procedures, equipment, and personnel are qualified for depth-sizing when the RMS error of the flaw depth measurements, as compared to the true flaw depths, do not exceed 0.125 in. (3 mm)."

The EPRI has contended that nondestructive examination inspectors are able to accurately depth size flaws if they can achieve an RMS error of less than 10 percent of the weld wall thickness. The licensee stated that the 0.242 inch RMS error achieved by the proposed inspection procedure is less than 10 percent of the wall thicknesses of each weld (i.e., each weld is greater than 2.42 inches thick).

While the NRC staff has not endorsed the use of the 10 percent wall thickness as an acceptance value, the NRC staff has been working with members of ASME, the Performance Demonstration Initiative, and EPRI to evaluate the appropriate RMS error for the ultrasonic examination of dissimilar metal welds. The collaborative work culminated in the development of ASME Code Case N-695-1 which allows the use of an RMS error of 0.25 inches for inspections from the inner surface of a dissimilar metal weld of 2.1 inches thick or greater.

The NRC staff is currently reviewing ASME Code Case N-695-1 for inclusion in the next revision of Regulatory Guide 1.147. While this review is not complete, the NRC staff has performed sufficient review of the use of a 0.25 inch RMS error or less for depth sizing and finds the use of a 0.25 inch RMS error or less to be acceptable under these circumstances at PNP.

Therefore, the NRC staff finds that the proposed inspection procedure is acceptable because the proposed RMS error is consistent with ASME Code Case N-695-1 given that each of the nine welds is greater than 2.1 inches thick and the proposed RMS error is less than 0.25 inches.

#### 4.0 CONCLUSION

As set forth above, the NRC staff has determined that the proposed RMS error in the inspection procedure is acceptable, that the proposed alternative provides reasonable assurance that the structural integrity of the branch connections to the hot leg and cold leg piping will be adequately monitored to the end of the fourth ISI interval, and that the proposed alternative 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, effective September 17, 2015, the NRC authorizes the use of RR 4-23 for the remainder of the fourth 10-year interval at PNP, which began on December 13, 2006, and ended on December 12, 2015.

The NRC staff notes that all other ASME Code, Section XI and 10 CFR 55a(g)(6)(ii)(F) requirements for which relief was not specifically requested and approved in the subject request

for relief remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Stephen Cumblidge, NRR/DE

Date of Issuance: February 1, 2016

If you have any questions, please contact the Palisades Project Manager, Jennivine Rankin, at (301) 415-1530.

Sincerely,

*/RA/*

David J. Wrona, Chief  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure:  
Staff Evaluation of the Fourth 10-Year  
Interval Relief Request RR 4-23

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