



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

June 29, 2017

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 NO. 5 – 5 PROPOSED  
ALTERNATIVE, UNDER-VESSEL LEAKAGE EXAMINATION  
(CAC NO. MF8946)

Dear Sir or Madam:

By letter dated December 20, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16355A020), Entergy Nuclear Operations, Inc. (ENO, the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, “Rules for Inservice Inspection of Nuclear Power Plant Components” requirements at Palisades Nuclear Plant (PNP).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee requested to use the proposed alternative for the ASME Code-required reactor vessel system leakage direct visual testing on the basis that complying with the specified ASME Code requirements would result in hardship and/or unusual difficulty without a compensating increase in the level of quality and safety. The staff notes the letter dated December 20, 2016, also includes Relief Request RR 5-4 for a proposed alternative regarding the weld reference system. The NRC staff’s evaluation of RR 5-4 will be addressed by separate correspondence.


The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that ENO has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC authorizes the use of Relief Request RR 5-5, at PNP, during the fifth 10-year inservice inspection interval from January 1, 2018, through December 12, 2025.

The NRC staff notes that all other ASME Code 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 Project Manager, Jennivine Rankin at (301) 415-1530.

Sincerely,

A handwritten signature in black ink, appearing to read "David J. Wrona". The signature is fluid and cursive, with a prominent "D" and "W".

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

Docket No. 50-255

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv



UNITED STATES  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR RELIEF REQUEST NO. 5-5

USE OF ALTERNATE SYSTEM LEAKAGE TEST PRIOR TO PLANT STARTUP

PALISADES NUCLEAR PLANT

ENTERGY NUCLEAR OPERATIONS, INC

DOCKET NO. 50-255

1.0 INTRODUCTION

By letter dated December 20, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16355A020), Entergy Nuclear Operations, Inc. (ENO, the licensee) submitted an alternative to the requirements of Section XI, "Rules for Inservice Inspection [ISI] of Nuclear Power Plant Components," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), regarding under vessel leakage examination at Palisades Nuclear Plant (PNP).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee requested to use the proposed alternative for the ASME Code-required reactor vessel system leakage direct visual testing (VT-2) on the basis that complying with the specified ASME Code requirements would result in hardship and/or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

Adherence to Section XI of the ASME Code is mandated by 10 CFR 50.55a(g)(4), which states, in part, that ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI.

The regulation in 10 CFR 50.55a(z) states, in part, that alternatives to the requirements of paragraph (g) of 10 CFR 50.55a may be used, when authorized by the U.S. Nuclear Regulatory Commission (NRC), if the licensee demonstrates that: (1) the proposed alternative provides 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.

Enclosure

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request the use of an alternative and the NRC to authorize the proposed alternative.

### 3.0 TECHNICAL EVALUATION

#### 3.1 ASME Code Components Affected

The affected component is the PNP reactor vessel, ASME Code Class 1. The examination category (see Table IWB-2500-1) for the component is Category B-P, All Pressure Containing Components, Item No. B15.10.

#### 3.2 Applicable Code Addition and Addenda

The Code of Record (COR) for the fifth 10-year ISI interval at PNP is the ASME Code, Section XI, 2007 Edition through the 2008 Addenda. The fifth 10-year ISI interval started on December 13, 2015, and is scheduled to end on December 12, 2025.

#### 3.3 Applicable Code Requirement

The 2007 edition through the 2008 addenda of ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P, Item No. B15.10, requires a visual examination during system leakage test in accordance with IWB-5220, "System Leakage Test," prior to plant startup following a reactor refueling outage.

#### 3.4 Reason for Request

The licensee stated the following regarding the reason for this request for an alternative:

In order to perform the ASME BPV code required reactor vessel system leakage direct visual testing (VT-2), the area under the PNP reactor vessel would have to be accessed by workers. This area is extremely hazardous when the plant is in Mode 3, *Hot Shutdown*, which are the conditions required for system leakage testing. This alternative is requested on the basis that the resultant radiation exposure and industrial hazards experienced by the workers to perform this inspection under the Code required system conditions would result in hardship without a compensating increase in the level of quality and safety.

#### 3.5 Proposed Alternative and Basis for Use

The licensee describes the proposed alternative and basis for the alternative as follows:

Pursuant to 10 CFR 50.55a(z)(2), ENO requests authorization to use an alternative, at PNP, to the reactor vessel system leakage testing requirements specified in Subsubarticle IWB-5220. As an alternative to the required system leakage VT-2, ENO proposes the following primary coolant system (PCS) leakage monitoring and remote visual examinations.

ENO will determine leakage from PNP piping and components in the area under the reactor vessel in accordance with Paragraph IWA-5244, *Buried Components*, of ASME BPV Code Section XI 2007 Edition through 2008 Addenda. This requirement will be satisfied by PNP Technical Specification (TS) Surveillance Procedure DWO-1, *Operator's Daily/Weekly Items Modes 1, 2, 3, and 4*, which documents performance of a PCS leakage calculation to satisfy TS surveillance requirement (SR) 3.4.13.1. This SR requires PCS leak rate calculation on a 72-hour frequency. PNP TS 3.4.13, *PCS Operational Leakage*, limits unidentified PCS leakage to less than 1 gpm [gallons per minute] and if the source of the leakage is not identified, requires reduction of the leakage to less than 1 gpm within 4 hours, or the reactor must be placed in Mode 3 within the following 6 hours and in Mode 5, *Cold Shutdown*, within the following 36 hours. Additionally, if the unidentified leakage determined by the performance of DWO-1 is greater than 0.15 gpm, over a 3 hour leakrate test, at stable plant conditions, Abnormal Operating Procedure (AOP)-23, *Primary Coolant Leak*, is required to be performed to determine the source of leakage and to take appropriate actions. These limits were approved as documented in PNP renewed facility operating license DPR-20, through license amendment No. 260 and are applicable at all times when the PCS is greater than Mode 5.

Additionally, ENO will perform a remote visual examination of the area under the PNP reactor vessel once per refueling outage. This examination will document active leakage or evidence of leakage which may have occurred during the previous power cycle.

Based on the above listed alternative methods, ENO has determined that this proposed alternative reasonably maintains an acceptable level of quality and safety.

The licensee stated that in order to perform the ASME Code-required VT-2 examination the plant would need to be in Mode 3 prior to plant startup following a reactor refueling outage. Radiation levels under the reactor vessel are expected to be 2.5 roentgen equivalent man (rem) per hour (on contact), which is the maximum measured during cold shutdown. The licensee estimated that a total exposure of 1.5 to 2 rem would be received each time the examination is performed.

In addition to radiation concerns, the licensee describes additional industrial hazards associated with performing the direct visual examination:

Two significant hazards to the workers are that the only inspection area access is through a tube 30 inches in diameter, making this area a confined space with a high ambient air temperature that creates a heat stress environment. Ambient air temperatures with the primary coolant system at full temperature are expected to be approximately 300 degrees Fahrenheit. Access under these conditions would require significant ventilation to alleviate the high ambient air temperatures. However, since the access tube must remain unobstructed to allow for inspection personnel ingress and egress, the available space within the access tube for

ventilation ductwork is limited. Therefore, Subsubarticle IWB-5520 pressure testing will result in hardship without a compensating increase in the level of quality and safety.

### 3.6 Duration of Proposed Alternative

The licensee requested the following for the duration of this proposed alternative:

The proposed alternative was included in a previously authorized relief request to maintain the fourth 10-year interval ASME BPV Code of Record into the fifth 10-year interval for ISI related activities such as repair/replacement (R/R), pressure testing (PT), and nondestructive examination (NDE) until December 31, 2017. Therefore, the proposed duration of this alternative is for the remainder of the PNP's 5th 10-year ISI interval from January 1, 2018 through December 12, 2025.

### 4.0 NRC Staff Evaluation

The COR for the fifth 10-year ISI interval at PNP is the ASME Code, Section XI, 2007 Edition through the 2008 Addenda. The fifth 10-year ISI interval started on December 13, 2015, and is scheduled to end on December 12, 2025. By letter dated April 29, 2015 (ADAMS Accession No. ML15119A223), the licensee submitted Relief Request (RR) 5-1 to update the PNP ISI program to the ASME Code, Section XI, 2007 Edition with the 2008 Addenda while maintaining and performing ISI related activities such as R/R, PT, and NDE, to the fourth 10-year ISI interval COR which was the ASME Code, Section XI, 2001 Edition through 2003 Addenda. The purpose of RR 5-1 was to maintain standardization of the corporate administered R/R, PT, and NDE programs across its entire nuclear fleet by using the 2001 Edition through 2003 Addenda through December 2017. As part of the proposed alternative, RR 5-1, the licensee requested to extend previously approved alternative request RR 4-5 (NRC safety evaluation found at ADAMS Accession No. ML070790035), into the fifth 10-year ISI interval until December 31, 2017. RR 4-5 was a fourth 10-year ISI interval alternative that is identical to the current proposed alternative RR 5-5. RR 5-1, which extended the applicability of RR 4-5 into the fifth 10-year ISI interval from December 13, 2015, to December 31, 2017, was approved by the NRC on November 25, 2015 (ADAMS Accession No. ML15320A244). Therefore, the current proposed alternative is applicable to a portion of the fifth 10-year ISI interval from January 1, 2018, through December 12, 2025.

The licensee requested an alternative to performing a VT-2 visual examination, in accordance with ASME Code, Section XI, IWB-5220, of the reactor vessel during a system leakage test due to high radiation and the hazardous environment during the test. As an alternative to the VT-2 visual examination, the licensee has proposed to monitor the PCS for leakage from piping and components in the area under the reactor vessel in accordance with ASME Code, Section XI, IWA-5244, "Buried Components." The licensee has proposed to satisfy this requirement by performing technical specification surveillance requirement procedure, DWO-1, and by performing the PCS leakage calculation which ensures that the leakage requirements are met. The NRC staff finds that the PCS leak rate calculation on a 72-hour frequency, coupled with the corrective actions required by the licensee procedures to identify sources of PCS leakage, provides reasonable assurance that under vessel leakage, if it were to occur during plant operation, would be identified. In addition, the NRC staff finds that the remote visual

examination of the area under the reactor vessel, once per refueling outage, provides reasonable assurance that should leakage occur during operation go undetected, it will be detected during the refueling outage. In conclusion, the NRC finds that the proposed alternative provides reasonable assurance of structural integrity and leak tightness.

#### Hardship Justification

To perform the ASME Code-required visual examination in accordance with IWB-5220, the licensee stated that examiners would be required to enter the reactor cavity area under the vessel via the 30-inch diameter access tube. The licensee estimated ambient air temperatures to be approximately 300 degrees Fahrenheit when PCS is at full pressure and temperature. Given that this is a confined space, additional personnel would be required to support the entry into the area and access tube size would make ventilation of the area difficult. The licensee estimated personnel dose of 1.5 to 2.0 rem to complete an inspection. As discussed above, the NRC finds that the licensee's alternative examination provides reasonable assurance that should any substantial leakage occur during operation, it will be discovered by the licensee. Should undetectable leakage occur during operation, remote visual examinations should be able to identify leakage that may have occurred during the previous operating cycle.

Based on the above, the NRC finds that performing the ASME Code-required system leakage test in the area under the reactor vessel, would pose severe hazards to personnel and result in unnecessary radiation exposure to plant personnel. Therefore, the NRC staff finds that complying with the specified code requirement, to perform a VT-2 examination of the reactor cavity area under the vessel at operating pressure, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

#### 5.0 CONCLUSION

As set forth above, the NRC staff determines that performance of the ASME Code-required VT-2 visual examination of the reactor vessel during a system leakage test would result in hardship to the licensee due to high radiation levels and harsh environment in the area without a compensating increase in the level of quality and safety. The licensee's proposed alternative to monitor the PCS leakage, in conjunction with a remote visual examination during the refueling outage following a power cycle, provides reasonable assurance of structural integrity and leak tightness. Accordingly, the NRC staff concludes that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC authorizes the use of RR 5-5 at PNP during the fifth 10-year ISI interval, from January 1, 2018, through December 12, 2025.

All other ASME Code, Section XI, requirements for which relief has not been specifically requested and approved remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: R. Davis

Date of issuance: June 29, 2017

SUBJECT: PALISADES NUCLEAR PLANT – RELIEF REQUEST NO. 5 – 5 PROPOSED ALTERNATIVE, UNDER-VESSEL LEAKAGE EXAMINATION (CAC NO. MF8946) DATED: JUNE 29, 2017.

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