



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

June 19, 2015

Mr. Eric A. Larson, Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Mail Stop A-BV-SEB1
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2 – RELIEF
REQUEST NO. BV3-N-789 REGARDING CARBON STEEL PIPING FOR RAW
WATER SERVICE (TAC NOS. M4563 AND MF4566)

Dear Mr. Larson:

By letter dated August 5, 2014, FirstEnergy Nuclear Operating Company (the licensee) submitted request BV3-N-789 to the Nuclear Regulatory Commission (NRC). The licensee requested relief from the requirements of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code) Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," for the repair of Class 2 and 3 moderate energy carbon steel raw water service system piping at Beaver Valley Power Station, Units 1 and 2 (BVPS-1 and BVPS-2, respectively).

Specifically, pursuant to Title 10 of the Code of Federal Regulations (10 CFR) Section 50.55a(a)(3)(ii), the licensee requested to use the proposed alternative on the basis that complying with the specified requirement would result in a hardship or unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative is based on ASME Code Case N-789, "Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate-Energy Carbon Steel Piping for Raw Water Service, Section XI, Division 1."

The paragraph headings in 10 CFR 50.55a were changed by Federal Register notice dated November 5, 2014 (79 FR 65776), which became effective on December 5, 2014 (e.g., 10 CFR 50.55a(a)(3)(i) is now 50.55a(z)(1), and 50.55a(a)(3)(ii) is now 50.55a(z)(2)). See the cross-reference table, which are cited in the notice at ADAMS Accession No. ML14015A191 and ADAMS package Accession No. ML14211A050.

The NRC staff has reviewed the licensee's relief request, as set forth in the enclosed safety evaluation, and concludes that the proposed alternative will provide reasonable assurance of structural integrity of the subject components and that complying with the requirement would result in a hardship without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee's request for the use of the above stated alternative is authorized pursuant to 10 CFR 50.55a(z)(2), until the end of the first refueling outage following the end of both the Unit 1 forth 10-year ISI interval and the Unit 2 third 10-year ISI interval.

E. Larson

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

If you have any questions, please contact the Beaver Valley Project Manager, Taylor A. Lamb, at (301) 415-7128 or Taylor.Lamb@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Douglas A. Broaddus", with a stylized flourish at the end.

Douglas A. Broaddus, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
Safety Evaluation

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO RELIEF REQUEST BV3-N-789

FIRSTENERGY NUCLEAR OPERATING COMPANY

BEAVER VALLEY POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-334 AND 50-412

1.0 INTRODUCTION

By letter dated August 5, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14217A471), FirstEnergy Nuclear Operating Company (the licensee or FENOC) requested relief from the requirements of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code) Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," for Beaver Valley Power Station, Units 1 and 2 (BVPS-1 and BVPS-2, respectively).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3)(ii), the licensee requested to use the proposed alternatives in Relief Request BV3-N-789, to the temporary repair requirements of ASME Code Case N-789, "Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate-Energy Carbon Steel Piping for Raw Water Service, Section XI, Division 1," on the basis that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The paragraph headings in 10 CFR 50.55a were changed by Federal Register notice dated November 5, 2014 (79 FR 65776), which became effective on December 5, 2014 (e.g., 10 CFR 50.55a(a)(3)(i) is now 50.55a(z)(1), and 50.55a(a)(3)(ii) is now 50.55a(z)(2)). See the cross-reference table, which are cited in the notice at ADAMS Accession No. ML14015A191 and ADAMS package Accession No. ML14211A050.

2.0 REGULATORY EVALUATION

In this relief request, the licensee requested authorization of an alternative to the requirements of ASME Section XI, IWA-5244 pursuant to 10 CFR 50.55a(a)(3)(ii). However, as described above, the provisions for alternatives to the Code requirements due to hardship without a compensating increase in quality and safety were moved to 10 CFR 50.55a(z)(2).

The regulations in 10 CFR 50.55a(g)(4) specify that ASME Code class 1, 2, and 3 components (including supports) must meet the requirements set forth in the ASME Code, Section XI, "Rules for Inservice Inspection (ISI) of Nuclear Power Plant Components," except the design and assess provisions and the pre-service examination requirements, to the extent practical within the limitations of design, geometry, and materials of construction of the components.

Pursuant to 10 CFR 50.55a(z), alternatives to the ASME Code requirements may be authorized by the 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.

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 alternative proposed by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Relief Request

3.1.1 Component Identification

The affected components are ASME Class 2 and 3 moderate energy carbon steel raw water piping systems. Raw water is defined as water such as a river, lake, or well, or brackish/salt water used in plant equipment, area coolers and heat exchangers. Moderate energy is defined as less than or equal to 200 degrees fahrenheit (°F) and less than or equal to 275 pounds per square inch gauge (psig) maximum operating conditions.

3.1.2 Code Requirements for Which Relief is Requested

The 2001 Edition through 2003 Addenda of ASME Code, Section XI, Table IWA-4400 provides requirements for welding, brazing, metal removal and installation of repair/replacement activities.

3.1.3 Licensee's Proposed Alternative

The licensee proposed to use the requirements of ASME Code Case N-789, "Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate-Energy Carbon Steel Piping for Raw Water Service, Section XI, Division 1," as an alternative from the requirements for replacement or internal weld repair of wall thinning conditions resulting from degradation in Class 2 and 3 moderate energy carbon steel raw water piping systems in accordance with IWA-4000. The licensee explained that such degradation may be the result of mechanisms such as erosion, corrosion, cavitation, and pitting, but excluded are conditions involving flow-accelerated corrosion (FAC), corrosion-assisted cracking, or any other form of cracking. IWA-4000 requires repair or replacement in accordance with the Owner's Requirements and the original or later Construction Code. Other alternative repair or evaluation methods are not always practicable because of wall thinness and/or moisture issues. ASME Code Case N-789 was approved on June 15, 2011, by the ASME Board on Nuclear Codes and Standards and is included in the draft NRC Regulatory Guide (RG) 1.1.47, Rev 18, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," as conditionally approved and is not available for application without NRC approval until the draft RG is approved by the NRC. The NRC approved a Relief Request for the Exelon units to use Code Case N-799 by letter dated May 10, 2012 (ADAMS Accession No. ML12121A637).

3.1.4 Licensee's Duration of Relief Request

The licensee proposed to apply Code Case N-789, as needed, until the end of the first refueling outage following the end of both the Unit 1 fourth 10-year ISI interval and the Unit 2 third 10-year ISI interval. Any reinforcing pads installed before the end of the 10-year ISI interval will be removed during the next refueling outage, even if that refueling outage occurs after the end of the 10-year ISI interval.

3.1.5 Licensee's Basis for Relief

The licensee proposes to implement the requirements of ASME Code Case N-789 as a temporary repair of degradation in Class 2 and 3 moderate energy raw water piping systems resulting from mechanisms such as erosion, corrosion, cavitation, or pitting, but excluding conditions involving FAC, corrosion-assisted cracking, or any other form of cracking. The licensee stated that these types of defects are typically identified by small leaks in the piping system or by pre-emptive, non-code required examinations performed to monitor the degradation mechanisms.

The alternative repair technique described in Code Case N-789, which is part of the proposed relief request, involves welding a metal reinforcing pad to the exterior of the piping system to reinforce the degraded area and restore pressure integrity. The licensee will use this repair technique when it determines that the temporary repair method is suitable for the particular defect or degradation.

The licensee stated that the Code Case requires that the cause of the degradation be determined, and that the extent and rate of degradation in the piping be evaluated to ensure that there are no other unacceptable locations within the surrounding area that could affect the integrity of the repaired piping. The area of evaluation will be dependent on the degradation mechanism present. The licensee will perform a baseline thickness examination for a completed structural pad, attachment welds, and surrounding area, followed by monthly thickness monitoring for the first three months, with subsequent frequency based on the results of this monitoring, but at a minimum of quarterly. Areas containing pressure pads shall be visually observed at least once per month to monitor for evidence of leakage. If the areas containing pressure pads are not accessible for direct observation, then monitoring will be accomplished by visual assessment of surrounding areas or ground surface areas above pressure pads on buried piping, or monitoring of leakage collection systems, if available.

The licensee stated that the repair will be considered to have a maximum service life at the time until the next refueling outage, when a permanent repair or replacement must be performed. The proposed relief request specifies additional requirements for design of reinforcing pads, installation, examination, pressure testing, and inservice monitoring the same as in Code Case N-789.

The licensee stated that Code Case N-789 was approved by the ASME Board on Nuclear Codes and Standards on June 25, 2011; however, it has not been incorporated into NRC RG 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI Division 1," and thus is not available for application at nuclear power plants without specific NRC approval.

3.2 NRC Staff's Evaluation

Code Case N-789 will be conditionally approved in Revision 18 of RG 1.147. After Revision 18 is incorporated by reference, licensees will not be required to submit for relief to use Code Case N-789. Until such time, the regulations stated in 10 CFR 50.55a provide provisions for licensees to submit, for NRC review and approval, alternatives to ASME Code Section XI requirements regarding repair or replacement of degraded pipes.

Code Case N-789, as documented in the proposed alternative, provides detailed requirement for the initial evaluation, design, installation, examination, pressure testing, and inservice monitoring. The NRC will require that licensees follow two conditions to Code Case N-789, as detailed below:

- Areas containing pressure pads shall be visually observed at least once per month to monitor for evidence of leakage. If the areas containing pressure pads are not accessible for direct observation, then monitoring will be accomplished by visual assessment of surrounding areas or ground surface areas above pressure pads on buried piping, or monitoring of leakage collection systems, if available.
- For the pressure pad design, the higher of the 2 times the actual measured corrosion rate and 4 times the estimated maximum corrosion rate for the system must be used. If the actual measured corrosion rate in the degraded location is unavailable, the estimated maximum corrosion rate for the system assumed in the design must be calculated based on the same degradation mechanism as the degraded location.

The licensee's submittal states that they will be implementing both of the NRC conditions to Code Case N-789. As such, NRC staff finds the licensee's use of the Code Case acceptable.

The NRC staff notes that making permanent ASME Code compliant repairs may require piping to be removed from service, which may also require a plant shutdown. The staff considers this to be a hardship. The staff also notes that making code compliant repairs does not result in an increase in the level of quality and safety commensurate with the hardship. Therefore, the staff finds that the licensee's proposal is consistent with the requirements of 10 CFR 50.55a(z)(2) and is thereby acceptable.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the alternative method proposed by the licensee in BV3-N-789 provides reasonable assurance of structural integrity of the subject components and that complying with the requirement would result in hardship or unusual difficulty without a compensating increase in the 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)(2). Therefore, the NRC staff authorizes the use of the proposed alternative until the end of the first refueling outage following the end of both the Unit 1 fourth 10-year ISI interval and the Unit 2 third 10-year ISI interval.

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

Principal Contributor: Margaret Audrain, NRR
Michael Farnan, NRR

Date: June 19, 2015

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

If you have any questions, please contact the Beaver Valley Project Manager, Taylor A. Lamb, at (301) 415-7128 or Taylor.Lamb@nrc.gov.

Sincerely,

/RA JLamb For/

Douglas A. Broaddus, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
Safety Evaluation

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ADAMS Accession No.: ML15163A147

*via memo dated

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