



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

August 9, 2013

Mr. Mark E. Reddemann
Chief Executive Officer
Energy Northwest
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION – RELIEF REQUEST 3ISI-12,
PROPOSED ALTERNATIVE USING CODE CASE N-795 (TAC NO. MF0319)

Dear Mr. Reddemann:

By letter dated November 27, 2012, as supplemented by letter dated April 23, 2013, Energy Northwest (the licensee) submitted request for relief 3ISI-12, "Alternative Requirements for BWR [Boiling-Water Reactor] Class 1 System Leakage Test Pressure Following Repair/Replacement Activities, Section XI, Division 1," to the U.S. Nuclear Regulatory Commission (NRC) for review and authorization. Specifically, the licensee proposed to use the provisions of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-795 to perform leakage testing and associated VT-2 examination following repair/replacement activities at Columbia Generating Station. ASME Code Case N-795 has not been approved for use by the NRC staff in Regulatory Guide 1.147, Rev. 16. The licensee requested to use the proposed alternative on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The NRC staff has completed its review of the subject relief request and based on the enclosed safety evaluation, the staff concludes that proposed alternative 3ISI-12 provides reasonable assurance of structural integrity and leak tightness, and that complying with the ASME Code requirement would result in a 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 paragraph 50.55a(a)(3)(ii) of Title 10 of the *Code of Federal Regulations*. Therefore, the NRC staff authorizes use of the proposed alternative at Columbia Generating Station during the third 10-year inservice inspection interval that began on December 13, 2005, and is scheduled to end on December 12, 2015.

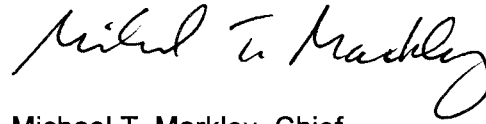
All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

M. Reddemann

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If you have any questions regarding this matter, please contact the NRC project manager, Fred Lyon, at (301) 415-2296 or via e-mail at Fred.Lyon@nrc.gov.

Sincerely,

A handwritten signature in black ink that reads "Michael T. Markley". The signature is written in a cursive style with a large, looping final flourish.

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
As stated

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELIEF REQUEST 3ISI-12, PROPOSED ALTERNATIVE USING CODE CASE N-795
DURING THE THIRD 10-YEAR INSERVICE INSPECTION PROGRAM
COLUMBIA GENERATING STATION
ENERGY NORTHWEST
DOCKET NO. 50-397

1.0 INTRODUCTION

By letter dated November 27, 2012, as supplemented by letter dated April 23, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML12340A066 and ML13122A162, respectively), Energy Northwest (the licensee) submitted request for alternative 3ISI-12, "Alternative Requirements for BWR [Boiling-Water Reactor] Class 1 System Leakage Test Pressure Following Repair/Replacement Activities, Section XI, Division 1," to the U.S. Nuclear Regulatory Commission (NRC) for review and authorization. Specifically, the licensee proposed to use the provisions of American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Case N-795 to perform leakage testing and associated VT-2 examination following repair/replacement activities at Columbia Generating Station. ASME Code Case N-795 has not been approved for use in NRC Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 16, October 2010 (ADAMS Accession No. ML101800536). The licensee requested to use the proposed alternative on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, paragraph 55a(g)(4), *Inservice Inspection Requirements*, 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. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year inspection interval and subsequent 10-year inspection intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b), 12 months prior to the start of the 120-month inspection interval, subject to the limitations and modifications listed therein.

Enclosure

Paragraph 55a(a)(3) of 10 CFR Part 50 states, in part, that alternatives to the requirements of 10 CFR 50.55a(g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) 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 the regulatory authority exists to authorize the licensee's proposed alternative on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Accordingly, the NRC staff has reviewed and evaluated the licensee's request pursuant to 10 CFR 50.55a(a)(3)(ii).

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Request for Alternative

The licensee is requesting relief from pressure requirement of the ASME Code, Section XI, required system leakage test of ASME Code, Section III, Class 1 system components, excluding the reactor vessel, on which repair/replacement activities have been performed.

ASME Code Requirements

The inservice inspection (ISI) Code of record for the Columbia Generating Station third 10-year ISI interval that started on December 13, 2005, and is scheduled to end on December 12, 2015, is the ASME Code, Section XI, 2001 Edition through the 2003 Addenda.

For pressure retaining boundaries on which repair/replacement activities have been performed by welding, ASME Code, Section XI, paragraph IWA-4540 requires a hydrostatic or system leakage test in accordance with IWA-5000 prior to, or as part of, returning to service. IWA-5200 requires that a VT-2 examination be performed to detect leakage while the system is in operation, during a system operability test, or while the system is at test conditions using an external pressurization source at temperature and pressure defined in IWB-5000. IWB-5221(a) requires the system leakage test to be conducted at a pressure not less than the pressure corresponding to 100 percent rated reactor power.

For mechanical joints resulting from repair/replacement activities¹, ASME Code, 1998 Edition, Section XI, paragraph IWA-4540(c) requires mechanical joints made in the installation of pressure retaining items be pressure tested during a system leakage test in accordance with IWA-5211(a). IWA-5211(a) requires that the system leak test be conducted during operation at nominal operating pressure, or when pressurized to nominal operating pressure and temperature.

¹ 10 CFR 50.55a(b)(2)(xxvi), *Pressure Testing Class 1, 2 and 3 Mechanical Joints*, requires licensees using the ASME Code, Section XI, 2001 Edition and later editions and addenda to use the 1998 Edition of the ASME Code, Section XI, Paragraph IWA-4540(c), for pressure testing Class 1, 2, and 3 mechanical joints.

ASME Code, Section XI, paragraph IWA-5213(b), requires a hold time after test pressure is attained for system pressure tests required by IWA-4540 of 10 minutes for noninsulated components, or 4 hours for insulated components, before the visual examination commences.

Licensee's Proposed Alternative

In lieu of the ASME Code compliant system leakage test following repair/replacement activities, the licensee proposes to perform the system leakage test at a pressure of at least 87 percent of the pressure required by IWB-5221(a), in accordance with the provisions of ASME Code Case N-795. The VT-2 visual examination will be performed after a 15-minute hold time for noninsulated components and after a 6-hour hold time for insulated components.

The licensee cited the following precedent: "Monticello Nuclear Generating Plant - One Time Inservice Inspection Program Plan Relief Request No. 8 for Leak Testing the "B" and "G" Main Steam Safety Relief Valves (TAC No. MB9538)," dated June 13, 2003 (ADAMS Accession No. ML031640464).

Licensee's Basis for Requesting Relief (as stated by the licensee)

Performance of the VT-2 visual examinations during the IWB-5221(a) pressure test with the plant at 100% power would result in high dose rates. High dosage rates pose personnel safety hazards that are contrary to As Low As Reasonably Achievable (ALARA) practices. Alternately, plant protective equipment could be manually altered to reach the IWB-5221(a) test pressure at a lower power level. However, operation of the plant at a lower power level with altered protective equipment places the plant in a state of undesirable operational risk due to reduced operating margins.

Performance of the VT-2 visual examinations during the IWB-5221(a) pressure test while the plant is in a shutdown condition requires either re-performance of the refueling outage Table IWB-2500-1 Category B-P system leakage test (Reactor Pressure Vessel (RPV) Leakage Test) or a customized local pressurization system leakage test. Both of these alternatives require abnormal plant system alignments that result in challenges to the plant and personnel.

Compliance with the IWB-5221(a) pressure test requirements results in additional plant challenges and delays without benefit as compared to pressure tests performed at slightly reduced pressures with extended hold times. Performing the system leakage tests following repair/replacement activities at the IWB-5221(a) required test pressure is not commensurate with the added dose benefit of allowing pressure testing and VT-2 visual examination at a low power level during normal plant startup procedures.

3.2 NRC Staff Evaluation

Performance of a system leakage test of pressure retaining boundaries on which repair/replacement activities have been performed is an integral part of ASME Code, Section XI, requirements. ASME Code, Section XI, paragraph IWB-5221(a) requires the system leakage

test to be conducted at a pressure not less than the pressure corresponding to 100 percent rated reactor power, 1020 pounds per square inch gauge (psig) for Columbia Generating Station. The nominal operating pressure of 1020 psig can be attained with normal startup and normal power ascension at a reactor power level of approximately 85 percent. If access to containment were permitted at this power level, personnel would be exposed to excessive radiation levels, contrary to ALARA practices. The NRC staff concludes that exposure of workers to high-radiation fields would present a hardship.

The licensee stated that plant protective equipment could be manually altered to reach the required test pressure at a lower power level or a customized local pressurization system could be employed. Operation of the plant with altered plant protective equipment can result in reduced operating margins and increased operational risks, and a customized local pressurization system leakage test would require abnormal plant system alignments. The NRC staff concludes that use of either of these methods to perform the system leakage test at 1020 psig could present a risk to plant operation and result in challenges to personnel and, therefore, would present a hardship.

Leak tightness and structural integrity of components involved in repair/replacement activities must be ensured. In a Final Rule published in the *Federal Register* on September 10, 2008 (73 FR 52746), the NRC stated, in part, that

A system leakage test does not verify fully the structural integrity of the repaired or replaced piping components. ... volumetric examination (NDE) will verify the structural integrity of the component as part of the repair or replacement activity.

In accordance with this stated NRC position, the NRC staff concludes that performance of a system leakage test at the proposed reduced pressure, in combination with compliance with ASME Code requirements for design, fabrication, and volumetric nondestructive examination (NDE), will ensure the structural integrity of components involved in the repair/replacement activities.

Leak tightness of components involved in repair/replacement activities can be ensured by visual examination for leakage while the component is under pressure. For a leaking component, the leakage rate is related to the differential pressure at the point of leakage and is proportional to the square root of the pressure difference. The provisions of ASME Code Case N-795 require that the system leakage test pressure is at least 87 percent of the pressure corresponding to 100 percent power. Should leakage exist, the leakage rate at 87 percent test pressure would be approximately 93 percent of the leakage rate at a pressure corresponding to that at 100 percent power. Furthermore, a 13 percent reduction in the test pressure is not expected to result in the arrest of a leak that would occur at nominal 100 percent operating pressure.

ASME Code, Section XI, paragraph IWA-5213(b) requires hold times before the VT-2 visual examination commences of 10 minutes for noninsulated components, or 4 hours for insulated components. By letter dated April 23, 2013, in response to the NRC staff's request for additional information dated March 14, 2013 (ADAMS Accession No. ML13071A322), the licensee committed to increase the hold times to 1 hour for noninsulated components or 8 hours for insulated components when employing the reduced pressure provisions of ASME Code Case N-795. The NRC staff concludes that these longer hold times are justified to allow for any

potential leakage to accumulate at the area of interest and be more evident during the VT-2 visual examination. The NRC staff concludes that the proposed alternate test pressure, when combined with the longer hold times, provides reasonable assurance of detecting leakage, should a leak exist and, therefore, the proposed alternative is acceptable to ensure leak tightness.

Based on the above, the NRC staff concludes that performing a VT-2 visual examination during a system leakage test at normal operating pressure would present a hardship. The NRC staff also concludes that performance of a system leakage test at the proposed reduced pressure, in combination with compliance with ASME Code requirements for design, fabrication, and volumetric NDE, provides reasonable assurance of structural integrity. Furthermore, the NRC staff finds that performing the VT-2 examination at a pressure of at least 87 percent of the pressure at 100 percent rated reactor power, with hold times of 1 hour for noninsulated components and 8 hours for insulated components, provides reasonable assurance of leak tightness.

The NRC staff notes that the provisions of ASME Code Case N-795 do not permit the use of the alternative test pressure to satisfy the requirements of Table IWB-2500, Examination Category B-P, or to satisfy pressure test requirements following repair/replacement activities on the reactor vessel.

4.0 CONCLUSION

As set forth above, the NRC staff concludes that proposed alternative 3ISI-12, "Alternative Requirements for BWR Class 1 System Leakage Test Pressure Following Repair/Replacement Activities, Section XI, Division 1," provides reasonable assurance of structural integrity and leak tightness, and that complying with the ASME Code requirement would result in a 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(a)(3)(ii). Therefore, the NRC staff authorizes use of the proposed alternative at Columbia Generating Station during the third 10-year ISI interval that began on December 13, 2005, and is scheduled to end on December 12, 2015.

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

Principal Contributor: Jay Wallace, NRR/DE/ESGB

Date: August 9, 2013

M. Reddemann

- 2 -

If you have any questions regarding this matter, please contact the NRC project manager, Fred Lyon, at (301) 415-2296 or via e-mail at Fred.Lyon@nrc.gov.

Sincerely,

/ra/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
As stated

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