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

November 3, 2016

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 FROM THE REQUIREMENTS OF THE ASME CODE (CAC NO. MF7368)

Dear Mr. Reddemann:

By letter dated February 17, 2016, as supplemented by letter dated September 20, 2016, Energy Northwest (the licensee), submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI requirements at Columbia Generating Station (Columbia).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee proposed an alternative to use ASME Code Case N-666-1, "Weld Overlay of Class 1, 2, and 3 Socket Welded Connections 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 NRC staff has reviewed the subject request and finds that the proposed alternative in request 4ISI-06 will provide reasonable assurance of the structural integrity and leak tightness of repaired socket welds. The NRC staff determines that complying with the specified ASME Code requirements 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 authorizes the use of alternative 4ISI-06 at Columbia for the remainder of the fourth 10-year inservice inspection interval ending December 12, 2025, or until Code Case N-666-1 is approved by the NRC in Regulatory Guide 1.147, at which time the licensee must use Code Case N-666-1 as approved by the NRC with any conditions identified.

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

If you have any questions regarding this matter, please contact Ms. Lisa Regner at (301) 415-1906 or via e-mail at Lisa.Regner@nrc.gov.

Sincerely,

Robert J. Pascarelli, Chief
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

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

RELIEF REQUEST NO. 4ISI-06 REGARDING CODE CASE N-666-1

ENTERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NO. 50-397

1.0 INTRODUCTION

By letter dated February 17, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16053A183), as supplemented by letter dated September 20, 2016 (ADAMS Accession No. ML16264A482), Energy Northwest (the licensee), submitted Relief Request 4ISI-06 to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," IWA-4420, regarding defect removal at the Columbia Generating Station (Columbia).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee proposed to use alternative ASME Code Case N-666-1, "Weld Overlay of Class 1, 2, and 3 Socket Welded Connections, Section XI, Division 1," on the basis that complying with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

The licensee's request proposes an alternative to the requirement of ASME Code, Section XI, IWA-4420 regarding defect removal.

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 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 proposed alternative.

3.0 TECHNICAL EVALUATION

3.1 Components Affected

ASME Code Class 1, 2, and 3 nominal pipe size (NPS) 2 inches and smaller socket welds.

3.2 Applicable Code Edition and Addenda

The Columbia inservice inspection (ISI) fourth 10-year interval ASME Code, Section XI, is the 2007 Edition through the 2008 Addenda.

3.3 Applicable Code Requirement

ASME Code, Section XI, IWA-4420, "Defect Removal Requirements," provides the code requirements for defect removal associated with repair/replacement activities.

3.4 Reason for Request (as stated by the licensee)

> Energy Northwest requests the approval to use an alternative to IWA-4420 for defect removal during repair of cracked or leaking socket welds in Class 1, 2, and 3, NPS 2 inches and smaller piping whose failure is the result of vibration fatigue. The additional time required for compliance with IWA-4420 requirements for defect removal will require Columbia Generating Station (Columbia) to remain in Technical Specification (TS) Required Actions for longer periods of time. This may challenge the Completion Time requiring further TS Required Actions up to and including plant shutdown. This would result in a hardship without a compensating increase in the level of safety and quality.
>
> During Columbia's third ten-year ISI interval, December 13, 2005 to December 12, 2015, ASME Code Case N-666 was approved for use without conditions by the Nuclear Regulatory Commission (NRC) in Regulatory Guide (RG) 1.147, Revision 16[(1)]. Code Case N-666 was applicable to Columbia's third ten-year ISI interval ASME Section XI Code of record, the 2001 Edition through the 2003 Addenda. Code Case N-666 is not applicable to Columbia's fourth ten-year interval ASME Section XI Code of record, the 2007 Edition through the 2008 Addenda as specified in the ASME Applicability Index for Section XI Cases, 2015 Edition. Code Case N-666-1 is applicable to the fourth ten-year ISI Code of record, but not approved for use by the NRC in RG 1.147, thus use of Code Case N-666-1 requires a relief request per 10 CFR 50.55a.

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(1) U.S. Nuclear Regulatory Commission, Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 16, October 2010 (ADAMS Accession No. ML101800536).

3.5 Proposed Alternative and Basis for Use (as stated by the licensee)

In lieu of the defect removal requirements of IWA-4420, Columbia proposes to implement the requirements of ASME Code Case N-666-1, "Weld Overlay of Class 1, 2, and 3 Socket Welded Connections, Section XI, Division 1," to restore structural integrity of a cracked or leaking socket weld in Class 1, 2, and 3, NPS 2 inches and smaller piping, resulting from vibration fatigue. Structural integrity may be restored by deposition of weld overlay on the outside surface of the pipe, weld, fitting, or flange. This weld overlay technique is not applicable to the full or partial penetration weld joining a pipe or fitting of a branch to the run of pipe nor is it applicable to systems containing petroleum products such as lubricating oil or fuel or other substances that create a fire or explosion hazard.

Performing defect removal and code repair in lieu of implementing this 10 CFR 50.55a request would in some cases necessitate longer periods in TS Required Actions which challenge the TS Completion Time, putting the plant at higher safety risks than warranted compared to the time required to install a weld overlay. Without the use of this Code Case in some situations, plant shut down may be necessary to perform a code repair/replacement activity.

3.6 Duration of Proposed Alternative

The licensee stated that the duration of the proposed alternative is for the fourth 10-year ISI interval ending December 12, 2025, or until Code Case N-666-1 is approved by the NRC in RG 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 18 (Draft RG DG-1296) (ADAMS Accession No. ML15027A202). At such time as the code case is approved, the licensee stated it will use Code Case N-666-1 with any conditions identified.

3.7 NRC Staff Evaluation

Code Case N-666-1 provides an alternative to the ASME Code requirements in IWA-4420 for defect removal during repair of cracked or leaking socket welds in Class 1, 2, and 3 NPS 2 inches and smaller piping whose failure is the result of vibration fatigue. On March 2, 2016, the NRC published in the *Federal Register* (81 FR 10780) a proposed rule which, in part, would incorporate by reference into the NRC regulations the latest revision of RG 1.147. As part of the proposed rule, the NRC staff proposed to endorse Code Case N-666-1 with two conditions (discussed below). The staff considered the two conditions proposed for Code Case N-666-1 in its review of the licensee's proposed alternative.

The licensee proposed to use ASME Code Case N-666-1 as an alternative to IWA-4420 for defect removal during repair of cracked or leaking socket welds in Class 1, 2, and 3 NPS 2 inches and smaller piping whose failure is the result of vibration fatigue. Code Case N-666 is listed in RG 1.147, Revision 17, for generic use, as acceptable for use without conditions; however, Code Case N-666-1 is not listed in RG 1.147, Revision 17.

Given that Code Case N-666 is approved for use without conditions, the NRC staff's evaluation of the licensee's proposed alternative focused on the differences between Code Cases N-666 and N-666-1, including the NRC's proposed conditions on Code Case N-666-1, as listed in Draft RG DG-1296.

Section 1 of Code Case N-666 states, in part, "[t]he references used in this Case refer to the 2004 Edition. For use with other Editions and Addenda, refer to Table 1 for applicable references." Code Case N-666, Table 1 "References for Alternative Editions and Addenda of Section XI," provides a crosswalk between the references listed in the code case and various editions and addenda of Section XI through the 2004 Edition. Given that the licensee's Code of record for the fourth 10-year ISI interval is the 2007 Edition through the 2008 Addenda of the ASME Code, Section XI, Code Case N-666 is not applicable to the current ISI interval. Code Case N-666-1 is applicable, however, it has not yet been endorsed by the NRC in RG 1.147 and, therefore, requires an alternative per 10 CFR 50.55a.

Code Case N-666-1 was modified to delete Table 1 listed in the previous version of the code case. Note 1 on Page 1 of Code Case N-666-1 states, "[t]he references in this Case are based on the 2004 Edition, except where references have specific Edition or Addenda specified. For use with other Editions or Addenda, refer to the Guideline for Cross-Referencing Section XI Cases, Table 1." This new Table 1 is located in 2015 ASME Code, Code Cases, Nuclear Components. Table 1 provides the user of code cases with a tool to identify the appropriate references in an ASME Code edition or addenda different from the one on which the code case is based, which allows management of the applicability of various code cases without having to revise each code case. Table 1 includes cross references for the 2007 Edition through the 2008 Addenda of Section XI and, thus, is applicable to the licensee's current ISI interval. The NRC staff notes that other than the modifications in N-666-1 related to differences in references between the code case and various editions and addenda of the ASME Code, the technical requirements of the code case have not changed.

The NRC proposed two conditions in Draft RG DG-1296, when using Code Case N-666-1:

> (1) A surface examination (magnetic particle or liquid penetrant) must be performed after installation of the weld overlay and seal weld on Class 1 and 2 piping socket welds. Fabrication defects, if detected, must be dispositioned using the surface examination acceptance criteria of the Construction Code identified in the Repair/Replacement Plan.
>
> (2) When the construction code does not require a surface or volumetric examination of the completed weld overlay a VT-1 visual examination is required to be performed after completion of the weld overlay and seal weld for Class 3 piping.

Based on public comments received by the NRC as part of the current rulemaking process, it appears that the wording in (1) above is confusing. It is not the intention of the proposed Condition (1) that the seal weld receive a surface examination, only the completed weld. The reasoning for conditioning the code case to require a surface examination is that some older codes of construction do not require a surface examination of completed ASME Code Class 1 and 2 socket welds. The NRC staff believes that a surface examination is important in verifying that the final weld surface is free of defects because the degradation mechanism for socket

welds repaired under this alternative is vibration fatigue, and surface defects not discovered by visual inspection could result in premature failure of the repaired weld.

The licensee verified, in a September 20, 2016, letter (ADAMS Accession No. ML16264A428), that a surface examination (magnetic particle or liquid penetrant) of socket welds in Class 1 and 2 NPS 2 inches and smaller piping is required by the Columbia code of construction. The NRC staff finds this acceptable, given that the licensee will meet the intent of proposed Condition (1), as listed in Draft RG DG-1296.

After further review, the NRC staff determined that proposed Condition (2), as described above, is redundant and not necessary given that Code Case N-666-1 already requires a VT-1 examination of all completed welds.

The NRC staff reviewed the licensee's basis regarding hardship. A plant shutdown to perform an ASME Code-compliant repair, when an acceptable alternative exist, results in cycling the unit and an increased potential for an unnecessary plant transient. This results in undue hardship to the plant. Additionally, performing the ASME Code repair during normal operation could challenge the TS Completion Time and place the plant at higher safety risk than warranted. Therefore, the NRC staff determines that compliance with the specified ASME Code repair requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.8 Summary

The NRC staff finds that the proposed alternative will provide reasonable assurance of the structural integrity because: (1) there are no technical changes between the previous revision of the code case, which is approved for use without conditions by the NRC in RG 1.147, and the current revision being requested for use as part of this alternative; (2) the NRC staff is not aware of any operational experience which indicates that the assumptions used by the NRC to approve the previous version of the code case are invalid; (3) the licensee will implement Code Case N-666-1, including any conditions, when it is published in RG 1.147, Revision 18; and (4) complying with ASME Code, Section XI requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety

4.0 CONCLUSION

The NRC staff finds that the proposed alternative in request 4ISI-06 will provide reasonable assurance of the structural integrity and leak tightness of repaired socket welds. The NRC staff determines that complying with the specified ASME Code requirements 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 authorizes the use of alternative 4ISI-06 at Columbia for the remainder of the fourth 10-year ISI interval ending December 12, 2025, or until Code Case N-666-1 is approved by the NRC in RG 1.147, at which time the licensee must use Code Case N-666-1 as approved by the NRC with any conditions identified.

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: R. Davis, NRR

Date: November 3, 2016

If you have any questions regarding this matter, please contact Ms. Lisa Regner at (301) 415-1906 or via e-mail at Lisa.Regner@nrc.gov.

Sincerely,

/RA/

Robert J. Pascarelli, Chief
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure:
Safety Evaluation

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