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

August 6, 2015

Mr. Kevin Davison
Site Vice President
Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota
1717 Wakonade Drive East
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2 – REQUEST 2-RR-4-10 ASSOCIATED WITH THE FOURTH 10-YEAR INTERVAL FOR THE INSERVICE INSPECTION PROGRAM (TAC NO. MF4794)

Dear Mr. Davison:

By letter dated September 3, 2014, as supplemented by letter dated October 20, 2014, Northern States Power Company – Minnesota (NSPM, the licensee), doing business as Xcel Energy, submitted a request for relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for the Prairie Island Nuclear Generating Plant, Unit 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(a)(3)(i) (retitled paragraph 50.55a(z)(1) by *Federal Register* notice 79 FR 65776, dated November 5, 2014), the licensee submitted request 2-RR-4-10, Revision 0, to use ASME Code, Section XI, IWB-3110, in lieu of ASME Code, Section XI, IWC-3112, for the acceptance of a volumetric indication of a flaw in the 22 replacement steam generator, on the basis that the alternative examination provides an acceptable level of quality and safety.

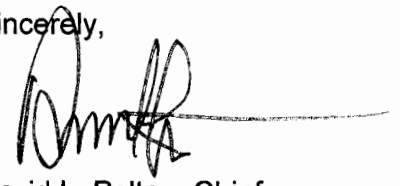
The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the proposed alternative and determined, as set forth in the enclosed safety evaluation, that NSPM adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1), and that the proposed alternative to use the requirements of ASME Code, Section XI, Paragraph IWB-3110 for the acceptance of a volumetric indication of a flaw in the 22 replacement steam generator provides an acceptable level of quality and safety.

The NRC staff authorizes the use of 2-RR-4-10 at the Prairie Island Nuclear Generating Plant, Unit 2, for the remainder of the fourth 10-year inspection interval of the Inservice Inspection Program, which is effective from December 21, 2004, through December 20, 2014, with extension through the end of the Unit 2 refueling outage (2R29).

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

If you have any questions, please contact Terry A. Beltz at 301-415-3049, or via e-mail at Terry.Beltz@nrc.gov.

Sincerely,



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

Docket No. 50-306

Enclosure:
Safety Evaluation

cc w/enclosure: Distribution via ListServ

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR RELIEF REQUEST 2-RR-4-10

REGARDING INSPECTION OF REACTOR VESSEL CLOSURE HEAD NOZZLES

NORTHERN STATES POWER COMPANY – MINNESOTA

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2

DOCKET NO. 50-306

1.0 INTRODUCTION

By letter dated September 3, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14247A639), as supplemented by letter dated October 20, 2014 (ADAMS Accession No. ML15036A252), Northern States Power Company – Minnesota (NSPM, the licensee), doing business as Xcel Energy, requested relief from the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, associated with the fourth 10-year interval for the Prairie Island Nuclear Generating Plant (Prairie Island), Unit 2, Inservice Inspection (ISI) Program.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), paragraph 50.55a(a)(3)(i), the licensee submitted request 2-RR-4-10, Revision 0, to use an alternative to meeting the requirements of ASME Code, Section XI, paragraph IWC-3112, by meeting the requirements of IWB-3112 for the acceptance of preservice volumetric and surface examinations of Class 1 components, on the basis that the alternative examinations provide an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

Inservice inspection of Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code, and applicable addenda, as required by 10 CFR 50.55a(g), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i).

By *Federal Register* notice 79 FR 65776, dated November 5, 2014, which became effective on December 5, 2014, the paragraphs headings in 10 CFR 50.55a were revised. Accordingly, relief requests that had been previously covered by 10 CFR 50.55a(a)(3)(i) are now covered under the equivalent 10 CFR 50.55a(z)(1) and relief requests that had been previously covered by 10 CFR 50.55a(a)(3)(ii) are now covered under the equivalent 10 CFR 50.55a(z)(2).

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: (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.

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 preservice examination requirements, set forth in the ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations require that ISI of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, which was incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

The fourth 10-year inspection interval of the ISI Program at Prairie Island, Unit 2, ended on December 20, 2014. However, the fourth 10-year ISI interval was extended through the end of the Unit 2 refueling outage (2R29) in the fall of 2015, as allowed by ASME Code, Section XI, paragraph IWA-2430(d). Paragraph IWA-2430(d) specifies that a licensee may extend or reduce an interval as much as 1 year.

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

The NRC staff's evaluation of the information provided by the licensee in support of the proposed alternative to the ASME Code requirements was evaluated and the bases for disposition are documented below.

3.1 ASME Code Requirement

The 1998 Edition through the 2000 Addenda of ASME Code, Section XI contains paragraph IWC-3112, which specifies acceptance of preservice volumetric and surface examinations as follows:

a) A component whose examination either confirms the absence of or detects flaws that do not exceed the standards of Table IWC-3410-1 shall be acceptable for service, provided the verified flaws are recorded in accordance with the requirements of IWA-1400(h) and IWA-6230 in terms of location, size, shape, orientation, and distribution within the component.

b) A component whose examination detects flaws that meet the nondestructive examination standards of NC-2500 and NC-5300 and are documented in Quality Assurance Records (NCA-4134.17) shall be acceptable.

c) A component whose examination detects flaws other than the flaws of IWC-3112(b) that exceed the standards of Table IWC-3410-1 is unacceptable for service unless the component is corrected by a repair/replacement activity to the extent necessary to meet the acceptance standards prior to placement of the component in service.

3.2 Licensee's ASME Code Relief Request

The licensee requested an alternative pursuant to 10 CFR 50.55a(z)(1) to use ASME Code, Section XI, IWB-3112 in lieu of ASME Code, Section XI, IWC-3112 for the acceptance of preservice volumetric and surface examinations of Class 1 components.

3.3 Licensee's Proposed Alternative and Basis for Relief Request (as stated)

During the 2R28 refueling outage in the fall of 2013, NSPM identified an indication of a flaw in the tubesheet-to-shell weld of the 22 Replacement Steam Generator (RSG) during a code required preservice [ultrasonic test (UT)]. The flaw was characterized as 0.44" in length, subsurface with a minimum depth of 0.82" and maximum depth of 1.10" from the outside surface. The material thickness at the indication was noted as 2.90".

The shell side of the 22 RSG is ASME Section XI, Class 2, and therefore falls under the rules of Subsection IWC for Class 2 Components. To be acceptable the flaw would need to meet one of the acceptance criteria of paragraph IWC-3112. IWC-3112 recognizes the following acceptance criteria:

(a) A component whose examination either confirms the absence of or detects flaws that do not exceed the standards of Table IWC-3410-1 shall be acceptable for service, provided the verified flaws are recorded in accordance with the requirements of IWA-1400(h) and IWA-6230 in terms of location, size, shape, orientation, and distribution within the component.

The flaw does not meet this criterion because Table IWC-3510-1 (which is referenced by Table IWC-3410-1) is limited to materials with specified minimum yield strength of 50 [kilopounds per square inch (ksi)] or less at 100 [degrees Fahrenheit (°F)]. The 22 RSG is fabricated from SA-508 Grade 3 Class 2 material with a minimum yield strength of 65 ksi.

(b) A component whose examination detects flaws that meet the nondestructive examination standards of NC-2500 and NC-5300 and are documented in Quality Assurance Records (NCA-4134.17) shall be acceptable.

The flaw does not meet this criterion because the 22 RSG was fabricated under the rules of ASME Section III SubSection NB for Class 1 components. IWC-3112(b)

specifically requires meeting the examination standards of ASME Section III SubSection NC for class 2 components.

(c) A component whose examination detects flaws other than the flaws of IWC-3112(b) that exceed the standards of Table IWC-3410-1 is unacceptable for service unless the component is corrected by a repair/replacement activity to the extent necessary to meet the acceptance standards prior to placement of the component in service.

The flaw does not meet this criterion because the flaw was left in place when the 22 RSG was put in service.

The application of IWB is appropriate as the RSG was designed, fabricated, examined and accepted to the requirements of ASME Section III, Subsection NB, for Class 1 components.

IWB-3112(a) states:

> A component whose volumetric or surface examination either confirms the absence of or detects flaws that do not exceed the standards of Table IWB-3410-1 shall be acceptable for service, provided the verified flaws are recorded in accordance with the requirements of IWA-1400(h), IWA-2220(b), and IWA-6230 in terms of location, size, shape, orientation, and distribution within the component.

Table IWB-3410-1 provides the acceptance standard of IWB-3510, including Table IWB-3510-1. Table IWB-3510-1 provides for acceptance of planar flaws in, ". . . Ferritic steels that meet the requirements of NB-2331 and G-2110(b) of Section III," with no restriction on the yield strength of the material.

Disposition of the flaw was provided by the vessel fabricator in accordance with the requirements of IWB-3112. This disposition was based on a post fabrication informational UT which characterized the flaw as 0.45" in length at a depth of 0.82" from the outside surface and a material thickness of 3.00", which is consistent with the subsequent preservice examination after hydrotest and post weld heat treatment.

This evaluation determined the flaw to be acceptable using Table IWB-3510-1 based on demonstration of adequate material toughness and a depth-to-thickness ratio (a/t) of 5.0%, compared to an allowable value of 7.7%.

As an alternative to the requirements of IWC-3110, NSPM requests approval to use the requirements of IWB-3110 for acceptance of a volumetric indication of a flaw in the 22 RSG.

3.4 NRC Staff Evaluation

The NRC staff reviewed the licensee's proposed alternative pursuant to 10 CFR 50.55a(z)(1) to use ASME Code, Section XI, IWB-3112 in lieu of ASME Code, Section XI, IWC-3112 for the acceptance of preservice volumetric and surface examinations of Class 1 components.

As previously discussed, the 22 RSG was designed, fabricated, examined, and accepted to the requirements of ASME Code, Section III, Subsection NB for Class 1 components. The license identified an indication of a flaw in the tubesheet-to-shell weld of the 22 RSG during a Code-required preservice UT. The shell side of the 22 RSG is ASME Section XI, Class 2, and, therefore, falls under the rules of ASME Code, Section XI, Subsection IWC for Class 2 components. To be acceptable, the flaw would need to meet one of the acceptance criteria of paragraph IWC-3112. The staff understands that the flaw does not meet the acceptance criteria, as stated in the licensee's basis for the proposed alternative, because Table IWC-3410-1 limits the materials with specified minimum yield strength of 50 ksi or less at 100°F and, as previously discussed, the 22 RSG was fabricated from SA-508 Grade 3 Class 2 material with a minimum yield strength of 65 ksi.

In addition, the staff understands that the flaws of ASME Code, Section XI, Paragraph IWC-3112(b), that exceed the standards of Table IWC-3410-1 are unacceptable for service unless the component is corrected by a repair/replacement activity to the extent necessary to meet the acceptance standards prior to placement of the component in service. The flaw was left in place when the 22 RSG was put in service.

The licensee determined that application of ASME Code, Section XI, IWB is appropriate because the RSG was designed, fabricated, examined and accepted to the requirements of ASME Section III, Subsection NB, for Class 1 components. The NRC staff recognizes that ASME Code, Section XI, IWB-3112(a) states that a component whose volumetric or surface examination either confirms the absence of or detects flaws that do not exceed the standards of Table IWB-3410-1 shall be acceptable for service, provided the verified flaws are recorded in accordance with the requirements of IWA-1400(h), IWA-2220(b), and IWA-6230 in terms of location, size, shape, orientation, and distribution within the component. In addition, ASME Code, Section XI, Table IWB-3410-1, employs the acceptance standard of IWB-3510 which includes Table IWB-3510-1. Table IWB-3510-1 provides for acceptance of planar flaws in ferritic steels that meet the requirements of NB-2331 and G-2110(b) of Section III, with no restriction on the yield strength of the material. The disposition of the flaw was provided by the vessel fabricator in accordance with the requirements of IWB-3112. This disposition was based on a post-fabrication informational UT examination, which characterized the flaw as 0.45 inches in length at a depth of 0.82 inches from the outside surface and material thickness of 3.00 inches, which is consistent with the subsequent preservice examination after hydrotest and post-weld heat treatment.

3.5 Summary

Based on the above, the NRC staff reviewed the basis for the licensee's proposed alternative and finds it to be acceptable, in that the flaw characteristics are acceptable using ASME Code, Section XI, Table IWB-3510-1, based on demonstration of adequate material toughness and a depth-to-thickness ratio of 5.0 percent, as compared to an allowable value of 7.7 percent. Additionally, the staff finds that based on its review of the licensee's basis for the request in that the 22 RSG was designed, fabricated, examined, and accepted to the requirements of ASME Code,

Section III, Subsection NB for Class 1 components, the licensee's proposed alternative to the requirements of ASME Code, Section XI, paragraph IWC-3110, to use the requirements of ASME Code, Section XI, paragraph IWB-3110, for the acceptance of a volumetric indication of a flaw in the 22 RSG continues to provide an acceptable level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff finds that the licensee adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1), and is in compliance with the requirements of 10 CFR 50.55a with the authorization of the licensee's proposed alternative.

The NRC staff further finds that the alternative method proposed by the licensee in 2-RR-4-10 will provide an acceptable level of quality and safety, and that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1), and remains in compliance with the requirements of the ASME Code, Section XI.

The NRC staff authorizes the use of 2-RR-4-10 at the Prairie Island, Unit 2, for the remainder of the fourth 10-year inspection interval of the ISI Program, which is effective from December 21, 2004, through December 20, 2014, with extension through the end of the Unit 2 refueling outage (2R29).

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

Principal Contributor: Tom McLellan, NRR/DE/EVIB

Date: August 6, 2015

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

If you have any questions, please contact Terry A. Beltz at 301-415-3049, or via e-mail at Terry.Beltz@nrc.gov.

Sincerely,

/RA/

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

Docket No. 50-306

Enclosure:
Safety Evaluation

cc w/enclosure: Distribution via ListServ

DISTRIBUTION:
PUBLIC
LPL3-1 r/f
RidsNrrDorlLpl3-1 Resource
RidsRgn3MailCenter Resource
RidsNrrPMPrairieIsland Resource
RidsNrrLAMHenderson Resource
RidsNrrLAJBurkhardt Resource
RidsNrrDeEvib Resource
RidsDorlDpr Resource
RidsAcrsAcnw_MailCTRResource
KMorganButler, OEDO
TMcLellan, NRR

ADAMS Accession No.: ML15196A195 ***SE transmitted via email dated 06/09/2015**

OFFICE	DORL/LPL3-1/PM	DORL/LPL1-1/LA	DE/EVIB/BC *	DORL/LPL3-1/BC
NAME	TBeltz	MHenderson (JBurkhardt for)	JMcHale	DPelton
DATE	7/31/2015	7/29/2015	6/09/2015	8/06/2015

OFFICIAL RECORD COPY