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

May 4, 2015

Mr. Kevin K. 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, UNITS 1 AND 2 – RELIEF REQUESTS (1-RR-5-5 AND 2-RR-5-5) FOR THE FIFTH 10-YEAR INTERVAL FOR THE INSERVICE INSPECTION PROGRAM (TAC NOS. MF4839 AND MF4840)

Dear Mr. Davison:

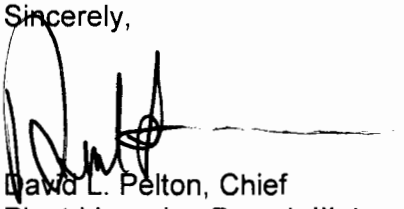
By letter dated September 15, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14258A073), as supplemented by letters dated October 20, 2014, and February 4, 2015 (ADAMS Accession Nos. ML14293A458 and ML15036A253, respectively), Northern States Power Company – Minnesota (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, IWA-4400, at the Prairie Island Nuclear Generating Plant, Units 1 and 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(a)(3)(ii) (retitled paragraph 50.55a(z)(2) by 79 FR 65776, dated November 5, 2014), the licensee submitted relief requests 1-RR-5-5, Revision 1, and 2-RR-5-5, Revision 1, for the respective units. The licensee proposed to use alternative ASME Code Case N-789-1, "Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate-Energy Carbon Steel Piping for Raw Water Service, Section XI, Division 1," for the repair of the cooling water system piping on the basis that complying with the specified ASME Code requirement to repair the subject piping would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The 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)(2), and remains in compliance with the ASME Code requirements. Therefore, the NRC authorizes the use of relief requests 1-RR-5-5, Revision 1, and 2-RR-5-5, Revision 1, at the Prairie Island Nuclear Generating Plant, Units 1 and 2, respectively, for the fifth 10-year inservice inspection interval. The fifth 10-year inspection interval of the Inservice Inspection Program for Units 1 and 2 is effective from December 21, 2014, through December 20, 2024.

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 Nos. 50-282 and 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 REQUESTS 1-RR-5-5, REVISION 1, AND 2-RR-5-5, REVISION 1

RELATED TO THE FIFTH 10-YEAR INSERVICE TESTING PROGRAM INTERVAL

NORTHERN STATES POWER COMPANY – MINNESOTA

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-282 AND 50-306

(TAC NOS. MF4839 AND MF4840)

1.0 INTRODUCTION

By letter dated September 15, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14258A073), as supplemented by letters dated October 20, 2014, and February 4, 2015 (ADAMS Accession Nos. ML14293A458 and ML15036A253, respectively), Northern State 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, IWA-4400, at the Prairie Island Nuclear Generating Plant, Units 1 and 2. The licensee submitted contingency relief requests 1-RR-5-5, Revision 1, and 2-RR-5-5, Revision 1, for Units 1 and 2, respectively.

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

2.0 REGULATORY EVALUATION

The licensee requests authorization of an alternative to the requirements of article IWA- 4400 of Section XI of the ASME Code pursuant to 10 CFR 50.55a(a)(3)(ii). The NRC reorganized 10 CFR 50.55a such that relief requests previously submitted pursuant to paragraph 50.55a(a)(3)(ii) are retitled under the equivalent paragraph 50.55a(z)(2), as provided in the *Federal Register* (79 FR 65776, dated November 5, 2014).

Article IWA-4400 of the ASME Code, Section XI, requires that unacceptable flaws in ASME Code Class 3 components be corrected by repair or replacement activity or be accepted by supplemental examination and flaw 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 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 ASME Code Component(s) Affected

The affected components are ASME Code Class 2 and 3 moderate energy, carbon steel cooling water (CL) system piping.

3.2 Applicable Code Edition and Addenda

The Prairie Island Nuclear Generating Plant, Units 1 and 2, commenced the fifth 10-year inspection interval of the ISI Program on December 21, 2014, and is required to follow the ASME Code, Section XI, 2007 Edition through the 2008 Addenda.

3.3 Applicable Code Requirement

ASME Code, Section XI, IWA-4400 provides requirements for welding, brazing, metal removal, and installation of repair/replacement activities.

3.4 Reason for Request (as stated by the licensee)

As stated in its application, the licensee requests proposed alternatives from the requirement for replacement or internal weld repair of wall thinning conditions resulting from degradation in Class 2 and 3 moderate energy, carbon steel CL system piping in accordance with the ASME Code, Section XI, IWA-4400. The licensee stated that such degradation may be the result of mechanisms such as localized erosion, corrosion, cavitation, and pitting, but excluded are conditions involving flow-accelerated corrosion (FAC), corrosion assisted cracking, or any form

of cracking. IWA-4000 requires repair/replacement activities in accordance with the Owner's Requirements and the original or later construction code.

The proposed alternative permits a temporary repair to provide adequate time for evaluation, design, material procurement, planning, and scheduling of appropriate permanent repair/replacement activity of the defective piping, considering the impact on system availability, maintenance rule applicability, and availability of replacement materials.

3.5 Licensee's Proposed Alternative and Basis

In lieu of repairing the degraded pipe in accordance with the ASME Code, Section XI, at the time of discovery, the licensee proposes to implement the requirements of ASME Code Case N-789-1 as a temporary repair of degraded cooling water system piping resulting from mechanisms such as localized erosion, corrosion, cavitation, or pitting. ASME Code Case N-789-1 provides provisions for the application of a metal reinforcing pad (pressure pad and structural pad) welded to the exterior of the piping system. The key requirements of the Code Case are summarized below.

3.5.1 General Requirements

Application of the reinforcing pad shall be performed in accordance with a Repair Replacement Plan satisfying the requirements of IWA-4150. The design, materials, and installation shall meet the requirements of the Construction Code and IWA-4000, except as stated in the Code Case.

If the minimum required thickness of reinforcing pad necessary to satisfy the requirements of Section 3 of the Code Case is greater than the nominal thickness for the size and schedule of the piping, this Code Case shall not be used. Additional reinforcement or repair is not permitted on top of an existing reinforcing pad. Reinforcing pads, including those installed during a refueling outage, shall not remain in service beyond the end of the next refueling outage. The Code Case may only be applied to piping not required to be ultrasonically examined for inservice inspection.

3.5.2 Initial Evaluation

The material beneath the surface to which the reinforcing pad is to be applied and the adjacent area shall be ultrasonically measured to establish the existing wall thickness, including the extent and configuration of degradation to be corrected by the reinforcing pad.

The cause and rate of degradation shall be determined. If the cause is determined to be flow-accelerated corrosion, corrosion-assisted cracking, or any other form of cracking, this Code Case shall not apply. The extent and rate of degradation in the piping shall 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 dimensions of the surrounding area to be evaluated shall be determined by the licensee, considering the type of degradation present. The area of evaluation will be dependent on the degradation mechanism present.

3.5.3 Design

Type of Reinforcing Pads

Reinforcing pads may be used for leak prevention only (i.e., pressure pad), or for leak prevention plus structural reinforcement of thinned areas including areas that do, or are expected to, penetrate the piping wall (i.e., structural pad).

Pressure pads are designed to retain pressure, and may be used only where the piping is predicted to retain full structural integrity until the next refueling outage assuming a corrosion rate of either two times the actual measured corrosion rate in that location, or three times the estimated maximum corrosion rate for the system.

In its February 4, 2015, letter, the licensee stated that it will follow the following corrosion rate determination for the pressure pads in lieu of the aforementioned corrosion rate in N-789-1:

The corrosion rate is two times the maximum rate observed at the location of the repair for the duration of the repair or between inspections. If the degradation rate at the repaired location is unknown, NSPM will apply four times the maximum degradation rate observed for that pipe system or a similar pipe system at the same plant site for the same degradation mechanism. If both the degradation rate at the repaired location and the cause of the degradation are not conclusively determined, NSPM will apply four times the maximum degradation rate observed for all degradation mechanisms observed for that pipe system or a similar pipe system at the same plant site.

Structural pads are designed for pressure plus structural reinforcement and may be used where the piping is predicted not to retain full structural integrity until the next refueling outage.

General Design Requirements - Pressure and Structural Pads

The design of reinforcing pads shall be in accordance with the applicable requirements of the Construction Code or the ASME Code, Section III (NC-3100, ND-3100 and NC-3600, ND-3600 including Appendix II).

The reinforcing pad shall be sized to encompass the unacceptable area with the attachment welds located on adjacent base material of sufficient thickness to accommodate the design stresses. The thickness of the reinforcing pad shall be sufficient to maintain required thickness until the next refueling outage. The tensile strengths of the plate and weld filler metal for the reinforcing pad shall be at least that specified for the base metal to which it is applied.

The predicted maximum degradation of the reinforced piping until the next refueling outage shall be included in the design. The predicted degradation of the piping shall be based on in-situ inspection of, and established data for, similar base metals in similar environments. If the reinforcing pad is predicted to become exposed to the raw water, the predicted degradation of the reinforcing pad shall be based upon established data for base metals or weld metals with similar chemical composition to that used for the reinforcing pad.

The following factors shall be included, as applicable, in the design and application of the pad: (1) Shrinkage effects, if any, on the piping. (2) Stress concentrations caused by installation of the reinforcing pad or resulting from existing and predicted piping internal surface configuration. (3) Effects of welding on any interior coating. (4) Added weight of the pad with respect to any design analyses that could be affected.

Specific Design Requirements - Pressure Pad

Fillet-welded pressure pads shall be designed to withstand the membrane strain of the piping in accordance with the requirements of paragraph 3.2(a) of the Code Case such that the following criteria are satisfied: (1) The allowable membrane stress is not exceeded in the piping or the pad and (2) The strain in the pad does not result in fillet weld stresses exceeding allowable stresses for such welds.

Design as a reinforced opening in accordance with the Construction Code shall satisfy the aforementioned requirement. Pressure pads may be designed as structural pads in accordance with section 3.4 of the Code Case or as prequalified designs in accordance with Section 3.5 of the Code Case.

Specific Design Requirements - Structural Pad

Structural pads shall meet the requirements of Section 3.2, Figure 1, of the Code Case and the following:
Unless otherwise established by analysis in accordance with the requirements of Section 3.2(a) of the Code Case, structural pads shall be attached by partial penetration attachment welds that extend for a distance of at least "*s*" in each direction beyond the area predicted, by the next refueling outage, to infringe upon the required thickness.

The thickness of the partial penetration attachment welds shall equal the thickness of the pad and the edges of the welds shall be tapered to the piping surface at a maximum angle of 45 degrees. Final configuration of the structural pad including attachment welds shall permit the examinations and evaluations required herein, including any required preservice or inservice examinations of encompassed or adjacent welds. Except for the tapered edges, the structural pad plate and attachment welds shall have a uniform thickness.

Prequalified Design

Application of structural pads on straight pipe, standard elbows, and associated welds shall be exempt from the requirements of Section 3.2(a) of the Code Case, provided all of the following conditions are satisfied. All other requirements of Sections 3.1, 3.2, and 3.4 of the Code Case are satisfied.

The axial length of structural pad plus width of partial penetration attachment welds shall not exceed the greater of 6 inches or the outside diameter of the piping. The finished structural pad shall be circular, oval, or rectangular in shape. The maximum dimension compensated by a circular structural pad shall not exceed two-thirds of the nominal outside diameter of the piping. Rectangular structural pads shall be aligned parallel with or perpendicular to the axis of the

piping. For oval structural pads, the end radii shall not be less than 0.75 $\sqrt{Rt_{nom}}$, and the axis of the structural pad shall be aligned parallel with or perpendicular to the axis of the piping.

3.5.4 Water-Back Applications

Attachment welds on water-backed piping shall be applied using the shielded metal arc welding process with low-hydrogen electrodes. When welding a reinforcing pad to a leaking area, precautions shall be taken to prevent welding on wet surfaces, such as installation of a gasket or sealant beneath the pad. For piping materials other than P-No. 1, Group 1, the surface examination shall be performed no sooner than 48 hours after completion of welding.

3.5.5 Installation

The base material in the area to be welded shall be cleaned to bare metal. Weld metal shall be deposited using a groove-welding procedure qualified in accordance with the ASME Code, Section IX, and the Construction Code. Provisions for venting during the final closure weld, or for pressurizing for leak-testing, shall be included, if necessary.

3.5.6 Examination

The completed attachment weld shall be examined using the liquid penetrant or magnetic particle method and shall satisfy the surface examination acceptance criteria for welds of the Construction Code or the ASME Code, Section III (NC-5300, ND-5300).

Except for the tapered edges, partial penetration attachment welds, including the piping base metal upon which they are applied, shall be ultrasonically measured to verify acceptable wall thickness. Partial penetration attachment welds shall be volumetrically examined when full penetration girth welds in the piping are required by the Construction Code to be volumetrically examined. Where configuration does not permit meaningful volumetric examination, the first layer, each 1/2 inch thickness of weld deposit, and the final surface shall be examined using liquid penetrant or magnetic particle in lieu of volumetric examination.

If volumetric examination is required, the full volume of the attachment weld, excluding the tapered edges, but including the volume of base metal required for the intended life of the reinforcing pad, shall be examined in accordance with the Construction Code or the ASME Code, Section III, using either the ultrasonic or radiographic method, and shall, to the depth at the surface of the piping, satisfy the acceptance criteria for weldments of the Construction Code or the ASME Code, Section III (NC-5320, ND-5320 or NC-5330, ND-5330). Any volume of the piping beneath the reinforcing pad that is credited in the design shall satisfy the volumetric acceptance criteria of the ASME Code, Section III (NC-5320, ND-5320 or NC-5330, ND-5330), as applicable.

3.5.7 Pressure Testing

In lieu of the ASME Code, Section XI, IWA-4540, a system leakage test of the repair/replacement activity shall be performed in accordance with IWA-5000 prior to, or as part

of, returning to service. Reinforcing pads attached to piping that has not been breached shall be equipped with pressure taps for performance of pressure testing.

3.5.8 Inservice Monitoring

Upon completion of the repair, inspections shall be performed for structural pads, using ultrasonic or direct thickness measurement, to record the thickness of the plate, the thickness at the attachment welds, including the underlying base metal, and to the extent examinable in a 3-inch wide band, surrounding the repair, as a baseline for subsequent monitoring of the repair.

The licensee shall prepare a plan for additional thickness monitoring for structural pads using ultrasonic or direct thickness measurement to verify that minimum design thicknesses, as required by the Construction Code or the ASME Code, Section III, are maintained until the next refueling outage. The monitoring shall be monthly for the first quarter and the subsequent frequency shall be based on the results of the monitoring activities, but at least quarterly. Provisions shall be made for access to structural pads on buried piping during operation to accomplish these examinations.

Areas containing pressure pads shall be monitored monthly for evidence of leakage. If the areas containing pressure pads are not accessible for direct observation, monitoring shall be accomplished by observation of surrounding areas or ground surface areas above pressure pads on buried piping; or leakage collection systems, if available, shall be monitored.

If the results of the monitoring program identify leakage or indicate that the structural margins required by Section 3 of the Code Case will not be maintained until the next refueling outage, the pad will be removed and repair/replacement activities shall be performed prior to encroaching on the design limits. All reinforcing pads, regardless of when installed, shall be removed no later than the end of the next refueling outage.

The relief requests specify additional requirements as follows:

Service Life of Pad

The repair (pressure pad or structural pad) will be considered to have a maximum service life of the time until the end of the next refueling outage, when a permanent repair/replacement activity shall be performed. The next refueling outage is defined as the next refueling outage for pads installed at power operation or during a forced shutdown. For a pad installed during a refueling outage, the next refueling outage is the refueling outage following the current refueling outage on the respective unit.

3.5.9 Radioactive Fluid

As discussed in the licensee's September 15, 2004, request, and October 20, supplement, the scope of the request is associated with the CL system, and does not include the circulating water or other raw water systems. The CL system is not considered a radioactive fluid and is not subject to routine tritium sampling.

3.5.10 Hardship Justification

The licensee stated that the use of ASME Code Case N-789-1 for pad reinforcement will apply when compliance with the specified ASME Code requirements would result in hardship or unusual difficulty without a compensating increase of quality and safety, such as requiring the plant to be shut down or challenging the completion time for a technical specification Required Action to complete a code repair.

The licensee further stated that performing permanent code repair/replacement in lieu of implementing the relief requests would in some cases necessitate longer periods in technical specification Required Actions which challenge the technical specification Completion Time, putting the plant at higher safety risks than warranted compared with the short time necessary to install a technically sound pad reinforcement repair. Without the use of this Code Case in some situations, plant shut down may be necessary to perform a code repair/replacement activity.

The licensee noted that the ASME Board on Nuclear Codes and Standards approved Code Case N-789-1 on November 13, 2013. However, it has not been incorporated into NRC Regulatory Guide 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.

3.6 Duration of Proposed Alternative

The licensee requested relief for the fifth 10-year inspection interval of the ISI Program for PINGP Units 1 and 2. The fifth inspection interval is effective for Units 1 and 2 from December 21, 2014, through December 20, 2024, or until Code Case N-789-1 is approved by the NRC in Regulatory Guide 1.147. The licensee stated that, at that time, the Prairie Island Nuclear Generating Plant will use Code Case N-789-1 as approved by the NRC with any conditions identified.

3.7 NRC Staff's Evaluation

The NRC staff evaluated the adequacy of the proposed alternative in maintaining the structural integrity of the repaired subject piping. The staff focused on the following key elements of the proposed alternative, as previously discussed in Section 3.5, above: (1) general requirements; (2) initial evaluation; (3) design requirements; (4) water-back application; (5) installation; (6) examination; (7) pressure testing; (8) inservice monitoring; and (9) hardship justification.

The NRC staff notes that many requirements specified in Code Case N-789-1 are not discussed in this safety evaluation, but they should not be considered as less important. As part of the NRC-approved proposed alternative, all requirements in the Code Case must be followed. Any exceptions to the Code Case that are approved in this safety evaluation also need to be followed.

3.7.1 General Requirements

The NRC staff notes that the proposed alternative requires the reinforcing pad be applied in accordance with a Repair Replacement Plan satisfying the requirements of the ASME Code, IWA-4150. The design, materials, and installation requirements of the Construction Code and IWA-4000, except as stated in the Code Case, must be satisfied.

The proposed alternative includes the following limitations: (1) the repair cannot be applied if the minimum required thickness of reinforcing pad necessary to satisfy the requirements of Section 3 of the Code Case is greater than the nominal thickness for the size and schedule of the piping; (2) additional reinforcement or repair on top of an existing reinforcing pad is prohibited; (3) reinforcing pads, including those installed during a refueling outage, shall not remain in service beyond the end of the next refueling outage; and (4) the repair is only applicable to piping not required to be ultrasonically examined for inservice inspection.

The NRC staff finds that the proposed general requirements, including limitations, are appropriate and, therefore, acceptable.

3.7.2 Initial Evaluation

The NRC staff finds that the proposed initial evaluation is acceptable because: (1) prior to installing the reinforcing pad, the proposed alternative requires that the based metal be ultrasonically examined to determine the cause and rate of degradation; (2) if the cause is determined to be flow-accelerated corrosion, corrosion-assisted cracking, or any other form of cracking, the licensee will not use this Code Case to repair the subject piping; and (3) the proposed alternative requires an inspection be performed to determine the extent of condition of the subject piping.

3.7.3 Design Requirements

The NRC staff finds that the reinforcing pads will be designed in accordance with the applicable requirements of the Construction Code or the ASME Code, Section III (NC-3100, ND-3100, and NC-3600, including Appendix II).

The NRC staff notes that the proposed alternative clearly defined the pressure pads and structural pads such that each type of pad will be applied for specific pipe degradation and purpose.

The NRC staff notes that Code Case N-789-1, paragraph 3.1(a)(1), specifies that a pressure pad is designed with a corrosion rate of either two times the actual measured corrosion rate in that location, or four times the estimated maximum corrosion rate for the system. However, in its February 4, 2015, letter, the licensee stated that it will follow the corrosion rate determination for the pressure pads as discussed above, in lieu of the aforementioned corrosion rate in Code Case N-789-1.

For the structural pad, the corrosion rate will be based on paragraph 3.2(f) in the Code Case, which requires that the predicted maximum degradation of the reinforced piping until the next

refueling outage be included in the design. The predicted degradation of the piping will be based on in-situ inspection of, and established data for, similar base metals in similar environments. The proposed alternative requires that if the reinforcing pad is predicted to become exposed to the raw water, the predicted degradation of the reinforcing pad shall be based upon established data for base metals or weld metals with similar chemical composition to that used for the reinforcing pad.

The NRC staff notes that the Code Case does not provide specific corrosion rate determination for the structural pad. It is not clear to the staff that the corrosion rate used in the structural pad design would be bounding, other than the fact that the structural pad will be designed for the duration until the next refueling outage. As a compensatory measure, the proposed alternative does require inservice monitoring to ensure the structural integrity of the repaired pipe using a structural pad. In addition, the proposed repair is limited to a maximum duration of one operating cycle. This relatively short duration of application should limit the degradation. However, should the actual corrosion rate exceed the projected corrosion rate during the operating cycle and a leak develop at or around the installed pad, the proposed inservice monitoring will be able to detect such leakage and the operator will be able to take corrective action.

The NRC staff notes that the structural pad will be designed with partial penetration attachment welds that extend for a distance in each direction beyond the area predicted, by the next refueling outage, to infringe upon the required thickness. Final configuration of the structural pad including attachment welds will permit the examinations and evaluations required herein, including any required preservice or inservice examinations of encompassed or adjacent welds. The proposed alternative requires that the thickness of the reinforcing pad will be sufficient to maintain required thickness until the next refueling outage.

Although it has concerns regarding the corrosion rate used in the structural pad design, the NRC staff finds that the proposed alternative will provide reasonable assurance of the structural integrity and leakage integrity of the repaired piping until the next refueling outage because (1) the structural pad will be designed to maintain required thickness until the next refueling outage, and (2) the proposed alternative requires periodic inservice monitoring as discussed further in this safety evaluation. Therefore, the NRC staff finds the aforementioned design requirements to be acceptable.

3.7.4 Water-Backed Applications

The proposed alternative requires the use of the shielded metal arc welding process with low-hydrogen electrodes for the attachment welds on water-backed piping. The proposed alternative further requires precaution be taken when welding a reinforcing pad to a leaking area. For piping materials other than P-No. 1, Group 1, the licensee will perform the surface examination no sooner than 48 hours after completion of welding. Therefore, the NRC staff finds that the proposed requirements for water-backed application to be acceptable.

3.7.5 Installation

The NRC staff finds that the proposed alternative requires the use a qualified welding procedure in accordance with the ASME Code, Section IX, and the Construction Code in addition to requirements specified in the Code Case. Therefore, the NRC staff finds the proposed installation requirements acceptable.

3.7.6 Examination

The proposed alternative requires a surface examination (liquid penetrant or magnetic particle) and volumetric examination be performed of the pad, weld and base metal after the reinforcing pad is welded to the pipe in accordance with Section III of the ASME Code, or the Construction Code. The NRC staff finds the proposed acceptance examinations follows Section III of the ASME Code, and the Construction Code. Therefore, the staff finds the proposed acceptance examinations to be acceptable.

3.7.7 Pressure Testing

The proposed alternative requires that a system leakage test will be performed in accordance with IWA-5000 prior to, or as part of, returning to the system to service. In addition, reinforcing pads attached to piping that have not been breached shall be equipped with pressure taps for performance of pressure testing. The NRC staff finds that the proposed pressure testing to be acceptable because it is consistent with IWA-5000 of the ASME Code, Section XI.

3.7.8 Inservice Monitoring

For the structural pad, the proposed alternative requires that the pad be examined using ultrasonic or direct thickness measurement, to record the thickness of the plate, the thickness at the attachment welds, including the underlying base metal, and to the extent examinable in a 3-inch wide band, surrounding the repair, as a baseline for subsequent monitoring of the repair. The licensee will monitor the structural pad monthly for the first quarter and the subsequent frequency will be based on the results of the monitoring activities, but at least quarterly.

For the pressure pad, the proposed alternative requires that the areas containing the pad be visually examined monthly for evidence of leakage. If the areas containing the pressure pad are not accessible for direct observation, the licensee will observe surrounding areas or ground surface areas above pressure pads on buried piping; or leakage collection systems, if available.

The licensee stated that if the results of the monitoring program identify leakage or indicate that the structural margins required by the Code Case will not be maintained until the next refueling outage, the pad will be removed and repair/replacement activities shall be performed prior to encroaching on the design limits.

The NRC staff finds that the proposed inservice monitoring requirements are acceptable because (1) the frequency and the examination method are adequate to monitor the structural integrity of the pressure pad and structural pad, and (2) the acceptance criteria for the pressure pad and structural pad are clearly defined and adequate.

3.7.9 Hardship Justification

The NRC staff finds that performing a plant shutdown to repair the subject piping would cycle the unit and increase the potential of an unnecessary transient, resulting in undue hardship. Additionally, performing the ASME Code repair during normal operation would challenge the Technical Specification 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 and leak tightness of the repaired cooling water system pipe because: (1) the scope of the application is clearly defined; (2) the pressure pad and structural pad will be designed in accordance with the Construction Code and ASME Code, Section III, and specific requirements as specified in Code Case N-789-1; (3) the degraded pipe will be examined and evaluated prior to the repair; (4) acceptance examinations will be performed to verify the condition of the repair; (5) the in-service monitoring will be performed to verify the pipe wall thickness and potential degradation; and (6) pressure testing will be performed in accordance with IWA-5000 of the ASME Code, Section XI.

4.0 CONCLUSION

As set forth above, the NRC staff finds that complying with IWA-4400 of the ASME Code, Section XI, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The staff finds that the licensee demonstrated that relief requestions 1-RR-5-5 and 2-RR-5-5 will provide reasonable assurance that the structural integrity and leakage integrity of the subject cooling water system piping will be maintained. 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).

The NRC staff notes that approval of these two relief requests does not imply or infer NRC approval of ASME Code Case N-789-1.

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 In-service Inspector.

The NRC staff authorizes the use of relief requests 1-RR-5-5, Revision 1, and 2-RR-5-5, Revision 1, at the Prairie Island Nuclear Generating Plant, Units 1 and 2, respectively, for the fifth 10-year inspection interval of the ISI Program. The fifth interval is effective for Units 1 and 2 from December 21, 2014, through December 20, 2024.

Principal Contributor: John Tsao, NRR/DE/EPNB

Date: May 4, 2015

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
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Office of Nuclear Reactor Regulation

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