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-5-2 AND 2-RR-5-2) FOR FIFTH 10-YEAR INTERVAL FOR THE INSERVICE INSPECTION PROGRAM (TAC NOS. MF4835 AND MF4836)

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 January 22, 2015 (ADAMS Accession Nos. ML14293A458 and ML15026A145, 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-5244(b), 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-5-2, Revision 1, and 2-RR-5-2, Revision 1, for the respective units, to use an alternative to that of IWA-5244(b) of the ASME Code, Section XI, for pressure testing of cooling water system piping on the basis that complying with the specified ASME Code requirement to perform the pressure testing 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-5-2, Revision 1, and 2-RR-5-2, 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
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR RELIEF REQUESTS 1-RR-5-2, REVISION 1 AND 2-RR-5-2, 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. MF4835 AND MF4836)

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 January 22, 2015 (ADAMS Accession No. ML14293A458 and ML15026A145, 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-5244(b), at the Prairie Island Nuclear Generating Plant, Units 1 and 2. The licensee submitted relief requests 1-RR-5-2, Revision 1, and 2-RR-5-2, 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 requested an alternative to that of IWA-5244(b) of the ASME Code, Section XI, for pressure testing of cooling water system piping, on the basis that complying with the ASME Code requirement to perform the pressure testing 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- 5244(b) 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).

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, as 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.

The fifth 10-year inspection interval of the Inservice Inspection (ISI) Program at the Prairie Island Nuclear Generating Plant, Units 1 and 2, commenced on December 21, 2014, and is currently scheduled to end on December 20, 2024.

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 Components

The affected components are ASME Code Class 3 buried cooling water (CL) system piping, Lines 30-CL-20 and 30-CL-23. The examination category is D-B and Item number is D2.10.

The relief request covers only the buried portions of the CL system piping on the discharge side of the CL pumps. The piping on the suction side of the safeguards CL pumps is not classified under the ASME Code. The safeguards CL pumps are submerged in the CL Safeguards Intake Bay and take suction directly from the bay. The non-safeguards pumps have short sections of suction piping which are outside the scope of the relief request.

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

Table IWD-2500-1 of the ASME Code, Section XI, 2007 Edition through the 2008 Addenda, requires a system leakage test of the pressure retaining boundary of Class 3 components once each inspection period of the 10-year ISI interval. The system pressure tests and visual examinations shall be conducted in accordance with IWA-5000 and IWD-5000. A portion of the CL system is buried and IWA-5244, "Buried Components" applies, providing requirements for those components that are buried.

IWA-5244(a) states that, "For buried components surrounded by an annulus, the VT-2 visual examination shall consist of an examination for evidence of leakage at each end of the annulus and at low point drains."

IWA-5244(b) states the following:

For buried components where a VT-2 visual examination cannot be performed, the examination requirement is satisfied by the following:

(1) The system pressure test for buried components that are isolable by means of valves shall consist of a test that determines the rate of pressure loss. Alternatively, the test may determine the change in flow between the ends of the buried components. The acceptable rate of pressure loss or flow shall be established by the Owner.

(2) The system pressure test for nonisolable buried components shall consist of a test to confirm that flow during operation is not impaired.

(3) Test personnel need not be qualified for VT-2 visual examination.

3.4 Licensee's Hardship in Complying with the Requirements (as stated by the licensee)

The licensee stated in its application that the CL system is designed to provide redundant cooling water supplies with isolation valves to the auxiliary feedwater pumps, the Unit 1 emergency diesel generators, air compressors, component cooling water heat exchangers, containment fan-coil units, and the Auxiliary Building unit coolers. Two diesel-driven CL pumps (DDCLP) and a vertical motor-driven CL pump (MDCLP) are located in the CL Screen House. A supply ring header, shared by Units 1 and 2, can be isolated automatically to provide two redundant independent sources of CL for all essential services. One-half of the essential services for each unit are supplied from each side of the isolable loop.

The licensee further stated that each side of the loop is designed to supply the needs for all essential services for both units. Failure of one side of the loop still provides for the operation of all equipment required for the safe shutdown of both units. Prairie Island technical specification (TS) 3.7.8 requires both trains of CL to be operable in Modes 1, 2, 3, and 4. A single train may be inoperable for 72 hours; both trains may be inoperable only if both units are in Mode 5 (cold shutdown). The licensee stated that taking the CL headers out of service to perform internal examination or install components and instrumentation to facilitate testing presents a hardship, as it requires both units to be shutdown.

The total approximate length of buried CL piping is 200 feet. The two 30-CL-20 and 30-CL-23 CL headers penetrate the Screen House horizontally through a wall into the soil in the yard. The headers go south for approximately 67 feet until they go under the Administration Building. The headers then pass under the Administration Building for approximately 22 feet and under the Turbine Building an additional 4 feet where they elbow vertically and come up through floor penetrations in the Turbine Building. Approximately 26 feet of each CL header is under the

Administration Building and Turbine Building, with an additional 3.5 feet in the Screen House wall penetrations. Therefore, approximately 29.5 feet of each header is buried under buildings and not readily accessible. The lines are buried to a depth of approximately 7 feet and 9 inches. The piping is protected by a cathodic protection system.

The licensee noted that instrumentation upstream of the buried piping consists of pressure indication at the discharge of the CL pumps. No flow instrument exists upstream on the supply header. Downstream of the buried piping is a flow meter on the main header in the Turbine Building. Isolation of the buried portion of piping would include two 18-inch butterfly valves and two 24-inch butterfly valves on each supply line. These valves are only intended to provide isolation for maintenance activities at only static system pressure and not normal operating pressure as required by IWD-5221.

The licensee stated that, in 1992, it replaced the underground portions of piping (approximately 75 feet of each 30-inch line) with 30-inch diameter, ½-inch thick, A-106 carbon steel piping. The licensee applied an epoxy interior coat for additional protection to prolong pipe life.

The licensee stated that the subject buried piping does not have an annulus and is not accessible for examination without excavation. The licensee also stated that, based on the absence of an annulus and the fact that the lines are isolable, IWA-5244(b)(1) applies to the CL buried piping. Subparagraph IWA-5244(b)(1) requires either a test to determine the rate of pressure loss, or a test to determine the change in flow between the ends of the buried components.

The licensee stated that to implement a pressure loss test, closure of several large butterfly valves would be required to isolate the buried portions of piping. This would isolate one CL supply header and require entry into Condition B of TS 3.7.8, requiring restoration of the supply header in 72 hours. This action would also require that the Unit 1 emergency diesel generator be declared inoperable and, if the unit is in Mode 4, that the residual heat removal loops be declared inoperable. The licensee noted that in addition to placing the units in an undesirable operational condition, the butterfly valves required for isolation of the supply header are not expected to provide an adequate test boundary necessary to conduct a pressure decay test.

The licensee indicated that another test option provided by the ASME Code is a change in flow test. However, the CL supply headers were not designed with plant instrumentation and flow orifices on the exposed ends of piping, which are required to determine the change in flow rates. In addition, sufficient lengths of accessible straight pipe for reliable use of ultrasonic flow meters do not exist. The licensee stated that installation of permanent flow instruments would require system modifications. For these reasons, the configuration of the CL system will not allow determining the change in flow between the ends of the buried piping.

The licensee stated that performing the specified examinations or testing would require either excavating the buried piping, entering multiple TS action statements, or performing major modifications to system piping. Therefore, the licensee stated that compliance with the specified requirements is a hardship without a compensating increase in the level of quality and safety.

3.5 Licensee's Proposed Alternative and Basis

Pursuant to 10 CFR 50.55a(z)(2), the license requested relief from the provisions of IWA-5244(b)(1) of the ASME Code, Section XI. In lieu of IWA-5244(b)(1), the licensee proposed to use the alternative requirements of ASME Code Case N-776. The NRC staff notes that it has not approved Code Case N-776.

ASME Code Case N-776, Paragraph (b)(1), states that a VT-2 visual examination shall be performed to identify leakage on ground surfaces in the vicinity of the buried components and in areas where leakage might be channeled or accumulated. Paragraph (b)(2) states that a test that determines the rate of pressure loss, a test that determines the change in flow between the ends of the buried components, or a test that confirms that flow during operation is not impaired shall be performed. Paragraph (b)(3) states that the Owner shall specify criteria for the examinations and tests of (b)(1) and (b)(2).

The licensee proposed to (1) perform a pump test to confirm that flow during operation is not impaired on the buried portion of CL piping in conjunction with the quarterly testing of the CL pumps (i.e., the system leakage test for the subject piping will be based on the quarterly pump tests), and (2) perform a VT-2 visual examination of the ground surface areas above the buried CL piping.

The licensee currently tests three CL pumps (12 and 22 DDCLP, and 121 MDCLP) on a quarterly periodicity per the requirements of the Inservice Testing (IST) Program. During these tests, the flow and pressure of the CL pumps are plotted against a test reference value (i.e., pump performance curve). The pressure is recorded at the discharge of the pump and flow measurements are recorded in the Turbine Building.

As the pump degrades, the total discharge head will decrease at the reference flow rate. As the flow rate instruments are located downstream of the buried piping, a decrease in pump head during testing may also indicate leakage from the CL system between the pump discharge and flow meter in the Turbine Building. The licensee stated that a leak in the buried portion of the CL header would result in reduced pump performance on the pump curve.

The licensee stated that if the CL pump performance drops below the reference range on the performance curve, and the cause of the deviation is not attributed to the test instruments being used, it will evaluate the cause of the reduced performance as required by the IST Program. If the pump performance falls into the action range (i.e., degraded), the pump would be declared inoperable and further corrective actions (i.e., maintenance on the pump, system walk downs, etc.) would be initiated to restore the pump and/or system to an operable status.

The licensee stated that if a pump is declared inoperable and was later determined to meet applicable criteria, it would investigate the cause of the apparent reduced pump performance. This could include aligning one of the other safeguards pumps to the affected header supply piping. Downstream flow and pump head during performance of these surveillance procedures are trended as part of the IST Program. In addition to periodic pump testing, the licensee stated that a visual examination of the ground surface areas (includes surfaces of asphalt or other pavement materials) above the buried CL piping is performed on a refueling cycle basis. The

system will be in operation at nominal operating conditions for at least 24 hours prior to performing the VT-2 visual examination.

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 interval is effective for Units 1 and 2 from December 21, 2014, through December 20, 2024.

3.7 NRC Staff's Evaluation

The NRC staff evaluated the effectiveness of the proposed alternative (i.e., performing quarterly pump testing coupled with visual examinations of the grounds) with regard to the structural integrity of the subject buried piping. The staff focused on the following topics: (1) conditions of the subject buried piping; (2) effectiveness of the proposed alternative; (3) consequence of undetected leakage; and (4) hardship justification.

3.7.1 Conditions of the Buried Piping

The subject lines are used for normal operation and shutdown continuously. The normal flow rate in the CL headers ranges from approximately 9,000 to 12,000 gallon per minute (gpm) for each train in summer months with both units online, to approximately 7,000 to 9,000 gpm for each train in winter months with both units online.

The operating temperature in the piping typically ranges from approximately 70 degrees Fahrenhit (°F) to 83°F in summer months and 50°F to 60°F in winter months. Header pressure is typically 95 to 110 psig [pounds per square inch gauge].

There are no flow meters installed at the pump discharge nozzles, pump suctions, or suction pipe intake openings. There is one flow meter for each CL header, located in the Turbine Building downstream of the buried sections of pipe and prior to entering the Auxiliary Building.

The NRC staff determines that the CL piping has low temperature and pressure. Based on industry operating experience, the most likely degradation mechanism is corrosion, and not stress corrosion cracking.

3.7.2 Effectiveness of Proposed Alternative

The NRC staff evaluated the effectiveness of the proposed alternative in terms of pump testing, proposed examinations, and monitoring during normal operation.

Pump Testing

The licensee stated that because impaired flow would be indicated by an abnormally low flow rate and high pump discharge pressure, the routine IST program testing provides indication that flow is not impaired. Significant leakage would be indicated by measured flow being lower than indicated by the pump curve for the given pressure. If the pump is determined not to be

degraded, the leakage rate can be estimated from the pump curve by subtracting the measured flow from the expected flow at the observed discharge pressure (i.e., a decrease in pump head). The location of the leakage would be indicated by abnormal ground wetness, and by excavation or other actions as needed to determine the exact location of leakage.

The NRC staff believes that a decrease in pump head may not be accurate to determine the leak rate because of the measurement uncertainty in the flow meter. In requests for additional information (RAI) dated December 8, 2014 (ADAMS Accession No. ML14343A001), the NRC staff questioned whether the licensee could install a portable, temporary flow meter at the pump discharge nozzle. The difference in reading between the portable flow meters located at the pump discharge nozzle and at the flow meter located in the Turbine Building would provide more accurate leak rate than based on a decrease in pump head. In its January 22, 2015, supplement, the licensee stated that sufficient lengths of accessible straight pipe for reliable use of portable ultrasonic flow meters do not exist. In addition, the licensee noted that the only flow meters associated with the CL pumps are downstream of the buried piping approximately 110 feet from the CL pumps.

The licensee stated that the acceptance criteria for the flow test are based on the acceptance criteria of the CL quarterly pump tests per the requirements of the IST program. Each of the three safeguards CL pumps are tested quarterly to verify that discharge flow and total developed head are within the pump operability curve. Each test procedure includes a family of pump curves depicting upper design limit, expected performance, an alert low, IST action low, and lower design limit.

If pump test results are in the Alert Range, the testing frequency is doubled until the cause of the deviation is determined and the condition corrected. It is permissible for the test instruments involved to be recalibrated and the test rerun. Plant evaluations give the conditions under which a pump can operate while in the Alert Range. If pump test results are in the Action Range, the pump is declared inoperable and the appropriate TS Action Statement(s) is entered.

The NRC staff questioned the lowest leak rate that can be detected by the proposed alternative in its December 8, 2014, RAIs. In its January 22, 2015, response, the licensee explained that the three safeguards CL pumps typically perform within plus 1 percent to minus 3 percent of the design pump curve at flows between 9,500 and 11,000 gpm during the IST Pump Test. A decrease in pump performance to 95 percent could indicate either a degraded pump or possible leakage. The estimated difference in flow between 100 percent and 95 percent of the pump curves at 10,000 gpm is 1,100 gpm. Quarterly pump testing is not considered the primary means of leak detection, but rather provides indication that flow is not impaired. As the CL headers are in continuous service, significant leakage is expected to be detected by VT-2 inspection in accordance with ASME Code Case N-776, operator rounds or observation by site personnel. The licensee further stated that leakage in the range of 300 to 500 gpm is assumed to result in abnormal wetness, sinkhole, or detectable leakage at the Screen house or Turbine Building pipe penetrations. A leak of approximately 1,100 gpm would result in a reduction of 5 percent on the pump performance curve. At this leak rate, the pump would still be above the 93 percent IST action level. If pump test results are in the Action Range per IST procedure, the pump is declared inoperable and plant TS Action statements are entered as applicable.

The NRC staff notes that the IST pump testing may not be able to detect small leaks because of the high volume of flow. However, the staff considers that the pump testing will still enable detection of leakage, and that the licensee will have sufficient time to take corrective actions. In addition, the pump testing is performed four times a year, which is more frequent than the frequency of every refueling outage as required in IWA-5000. Therefore, the NRC staff finds that the pump testing is one of the methods that provide reasonable assurance of the structural integrity of the subject buried piping. Other methods to ensure the structural integrity of the subject piping are periodic inspections and continuous monitoring as discussed below.

Proposed Examinations

ASME Code Case N-776, Paragraph (b)(1), requires that a VT-2 visual examination be performed to identify evidence of leakage on ground surfaces in the vicinity of the buried components and in areas where leakage might be channeled or accumulated. Portions of buried piping where a VT-2 examination is impractical (e.g., component is buried beneath impermeable material or encased in concrete) are exempt from VT-2 examination. The frequency of the VT-2 examination is not specified in the code case.

The licensee proposes to perform this examination on a refueling cycle basis. The licensee states, based on current fuel cycles of less than two years on each unit, that a VT-2 examination is expected to be performed approximately annually. Acceptance criteria for the VT-2 is no indication of abnormal wetness, or no unusual conditions in the examination area such as unexplained standing or flowing water, sink holes, or unusual wetness at exposed and accessible pipe penetrations.

Monitoring During Normal Operation

During normal operation, the CL system is monitored via main control room alarms, daily operator rounds, checks per plant procedures, visual examinations in accordance with ASME Code Case N-776, or observation by site personnel. The licensee stated that as the CL headers are in continuous service, the VT-2 examinations will be done as conditions permit independent of quarterly pump testing. For example, visual examinations of the ground surface are performed during the quarterly pump testing, during refueling outages, as well as through general equipment/area monitoring at least daily per procedure requirements.

The licensee stated that the main control room panel has eight alarms (high flow and low pressure) that could be used as indication of impaired flow or a CL header leak. Upon receipt of an alarm, operators will enter the CL system into an abnormal operating procedure for loss of CL pumping capacity or supply header without safety injection, loss of CL pumping capacity or supply header with safety injection, or CL leakage outside containment, depending on plant status.

The abnormal operating procedures for loss of CL pumping capacity or supply header direct the operator to respond to low header pressure, including evaluating CL pump status, separating the CL headers and evaluating CL pressure, evaluating CL header flows, and tripping the reactor as required. The procedures also direct recovery of a depressurized CL header by isolating loads from the affected header.

A separate abnormal operating procedure describes symptoms and the actions to be taken to isolate a leak in the CL header or branch connections. Each of these procedures requires the turbine and auxiliary building operators be notified of the loss of CL header or capacity and direct them to investigate. This would include checking outdoors for evidence of buried piping leakage and using procedural guidance for potential piping failure locations.

The licensee states that the structural integrity of the CL piping is monitored by the Underground Piping and Tanks Integrity (UPTI) Program for external corrosion and the Service Water/ Microbiological Induced Corrosion (SW/MIC) Program for internal corrosion. The UPTI program has implemented preventive maintenance procedures that require direct inspections in each 10 year period after the end of the original license. The SW/MIC program inspects a sample of the above ground piping each cycle, which may include piping that has been internally coated with epoxy. The combination of external and internal inspections on similar piping will permit reasonably inferring the condition of buried piping which may not be readily accessible. Ongoing preventative measures for both programs also ensure the structural integrity of the piping: impressed current cathodic protection as monitored by preventive maintenance procedures, and chlorination of the CL system.

In its December 8, 2014, RAIs, the NRC staff inquired as to whether a ground penetrating radar (GPR) or guided wave ultrasonic examination would be used to detect the exact location of a leak. In its January 22, 2015, response letter, the licensee explained that it would likely not use either GPR or guided wave ultrasonic examination to detect the location of a leak, as it does not have confidence in the ability of GPR to determine the exact leak location on piping. The licensee indicated that a recent article was published by the Multidisciplinary Digital Publishing Institute (MDPI.com) entitled *GPR-Based Water Leak Models in Water Distribution Systems.* The article, in part, states the following:

> Identifying leaks by GPR images is not an easy task and requires a high level of expertise by the operator. Added complications include the complex spatial arrangement of many networks, along with the steady growth in the supply infrastructure of cities. These aspects greatly increase the difficulty in using and interpreting data obtained with GPR in detecting leaks and analyzing the results, thus reducing the potential for solving problems and increasing the need for highly qualified personnel.

The licensee further explained that the piping geometry is not conducive to guided wave technology because of 45-degree or 90-degree elbows immediately before or after where the piping penetrates building walls or foundations. Since the piping runs between the Screen House and the Administration Building are relatively short and approximately 7 feet deep, the preferred methodology for determining the exact location of a leak would be through excavation, coupled with the use of GPR to pinpoint the leaking location.

Based on the aforementioned problems associated with using GPR and guided wave technology, the NRC staff considers these technologies to not be useful in detecting the exact location of a potential leak in this situation. The NRC staff also considers that annual performance of the VT-2 visual examination per Code Case N-776 is impractical due piping inaccessibility.

The NRC staff considers that the combination of control room alarms, daily operator rounds checks per plant procedures, other routine VT-2 visual examinations, observation by site personnel, the UPTI Program, the SW/MIC Program, and plant operating procedures, provide adequate monitoring capability of the buried portion of the CL piping. Therefore, the staff finds that the proposed alternative is effective because (1) the licensee has appropriate procedures of using IST pump testing to determine the potential for pipe leakage; (2) normal flow rate is sufficiently large, such that the licensee will be able to detect a leakage at a leak rate that the licensee will take corrective actions prior to the CL system becomes inoperable; and (3) current monitoring of the CL system appears adequate.

3.7.3 Consequence of Undetected Leakage

The NRC staff notes that any potential leakage in the CL piping that is buried in the yard can be detected by VT-2 examination. However, the CL piping buried under the buildings is inaccessible for visual inspection. The staff questioned how the leakage under the buildings would be identified, and also questioned that if the leak rate is undetected for an extended period whether the soil disintegration would affect the foundation of the buildings. The licensee stated that the sections of pipe are approximately 29.5 feet of each header under the Administration and Turbine Buildings and that leakage under the building would likely be detected by wetness on the floor or around floor penetrations.

The licensee stated that for those portions of piping located under the Administration Building, it is possible that undetected leakage would eventually undermine the foundation which would likely result in settling and cracking of walls and floors. For portions of piping located under the Turbine Building, the CL headers traverse under the building for approximately 4 feet, and it is expected that leakage under the Turbine Building would be detected at the CL header floor penetrations prior to any significant damage to the Turbine Building foundation.

The NRC staff finds that any damage affecting the Administration Building would not be severe. The Administration Building is not part of the nuclear unit and its degradation does not affect safe operation of the nuclear unit. As for the Turbine Building, the staff recognizes that the licensee can readily detect excessive leakage by the CL header floor penetrations.

3.7.4 Hardship Justification

The NRC staff finds that the licensee provided sufficient justification for not needing to perform the required system leakage test of the subject buried pipe in accordance with the ASME Code, Section XI, IWA-5244(b). Portions of the piping are routed underground and buried underneath buildings. 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 finds that the proposed alternative is acceptable to provide reasonable assurance of the structural integrity of the subject buried piping because the proposed IST pump testing and associated examination will provide necessary monitoring of the subject piping. The NRC staff further finds that the consequence of potential leakage of the buried piping under the Administration Building and Turbine Building will not significantly affect building structural integrity.

4.0 CONCLUSION

As set forth above, the NRC staff finds that complying with IWA- 5244(b) of Section XI of the ASME Code, 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 requests 1-RR-5-2 and 2-RR-5-2 will provide reasonable assurance that the structural integrity of the subject CL piping and its intended safety function 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-776.

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-5-2, Revision 1, and 2-RR-5-2, 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
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

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