



FEB 04 2015

L-PI-15-0014  
10 CFR 50.55a

U S Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Prairie Island Nuclear Generating Plant Units 1 and 2  
Dockets 50-282 and 50-306  
Renewed License Nos. DPR-42 and DPR-60

Supplement to 10 CFR 50.55a Requests (RR) 1-RR-5-1 and 2-RR-5-1 (TACs MF4833 and MF4834) Associated with Prairie Island Nuclear Generating Plant (PINGP) Fifth Ten-Year Interval Inservice Inspection (ISI) Program

By letter dated September 15, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14258A073), Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM"), submitted for NRC approval 10 CFR 50.55a Requests associated with the fifth ten-year interval for the Prairie Island Nuclear Generating Plant (PINGP), Units 1 and 2, Inservice Inspection (ISI) Program. By email dated December 18, 2014 (ML14353A460), the NRC requested additional information (RAIs) to complete the review of these requests. The enclosure to this letter provides the responses to the NRC Staff RAIs for 1-RR-5-1 and 2-RR-5-1.

If there are any questions or if additional information is needed, please contact Mr. Dale Vincent, P.E., at 651-267-1736.

Summary of Commitments

This letter contains no new commitments and no revisions to existing commitments.

A handwritten signature in black ink, appearing to read 'Kevin Davison'.

Kevin Davison  
Site Vice President, Prairie Island Nuclear Generating Plant  
Northern States Power Company - Minnesota

Enclosures (1)

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cc: Administrator, Region III, USNRC  
Project Manager, PINGP, USNRC  
Resident Inspector, PINGP, USNRC

## Enclosure

### **Supplement to 10 CFR 50.55a Requests (RR) 1-RR-5-1 and 2-RR-5-1 Associated with Prairie Island Nuclear Generating Plant (PINGP) Fifth Ten-Year Interval Inservice Inspection (ISI) Program**

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#### **NRC RAI RR-(5-1)-1:**

Provide materials of construction of the RPV [reactor pressure vessel] leak off lines piping.

#### **NSPM response:**

All affected piping is ASTM A-376 TP304 stainless steel.

#### **NRC RAI RR-(5-1)-2(a):**

NRC Information Notice 2014-02 "Failure to Properly Pressure Test Reactor Vessel Flange Leak-off Lines" discusses the requirements for system leakage testing of reactor pressure vessel (RPV) flange leak off lines. According to the requirements for the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), Section XI, IWB-2500, Table IWB-2500-1, Examination Category C-H, Item Numbers B15.10, the ASME Code Class 1 piping shall be subjected to system leakage testing each refueling outage.

- (a) Has the licensee performed system leakage test of the RPV leak off lines piping in the fourth 10-year ISI interval in accordance with the above requirement? If no, provide justification.

**NSPM Response:**

No. NSPM was granted an alternative from the requirements of IWB-2500 for pressure testing the RPV leak off lines under requests 1-RR-4-4 and 2-RR-4-4 by NRC letter dated April 27, 2005 (ML050960187). The alternative allowed for VT-2 visual examinations for the reactor vessel flange leak-off detection lines during the regularly scheduled Class 1 system pressure test that is performed following each refueling outage. The reactor vessel flange leak-off lines were not pressurized during the VT-2 visual examinations. However, the examinations were conducted subsequent to pressurization of the reactor vessel flange leak-off lines with borated water during refueling operations. During refueling operations, the reactor vessel flange leak-off lines are pressurized due to the static head in the reactor cavity to approximately 10 psig.

**NRC RAI RR-(5-1)-2(b):**

Does the licensee plan to perform system leakage test of the RPV leak off lines piping in the fifth 10-year ISI interval in accordance with the above requirement? If no, provide justification.

**NSPM Response:**

No. NSPM requests an alternative to the requirements of IWB-2500 based on hardship or unusual difficulty without a compensating increase in the level of quality and safety. The configuration of this system precludes manual testing while the vessel head is removed because the odd configuration of the vessel taps, combined with the small size of the tap and the high test pressure requirement (2235 psig minimum), which prevent the taps in the flange from being temporarily plugged. Failure of this seal could possibly cause ejection of the device used for plugging the vessel taps. Machining, installing and removing the plugs or pressure connections would require significant time at the vessel flange and excessive dose. The plug or pressure connection itself would also introduce a foreign material exclusion issue at the edge of the open reactor vessel. Plugging or installing a connection would require machining threads in each flange opening with a concern over chips that may become a foreign material threat for fuel integrity or in the lines themselves. Testing of the lines with the head installed would pressurize the inner O-ring in a direction opposite to its normal operation. This test pressure would result in a net inward force on the O-ring that would tend to push it into the recessed cavity that houses the retainer clips. The O-ring material includes thin silver plating and could very likely be damaged by this deformation into the recessed areas on the top head. System leakage testing of these lines at power is not an option because the lines will only be pressurized in the event of a failure of the inner O-ring.

NSPM proposes to perform a VT-2 visual examination of accessible portions of the reactor vessel flange leak-off lines during the regularly scheduled Class 1 system pressure test that is performed following each refueling outage (in lieu of the code

required frequency of each inspection interval). The reactor vessel flange leak-off lines will not be pressurized during the VT-2 visual examinations. However, the examination will be conducted subsequent to pressurization of the reactor vessel flange leak-off lines with borated water during the refueling operations. During refueling operations, the reactor vessel flange leak-off lines are pressurized due to the static head in the reactor cavity to approximately 10 psig. Since borated water leaves a crystalline residue, the proposed VT-2 visual examination each refueling outage provides reasonable assurance of structural integrity since through-wall leakage in the reactor vessel flange leak-off lines will be promptly detected and corrected in accordance with IWA-4000.

**NRC RAI RR-(5-1)-3(a):**

The ASME Code, Section XI, IWB-5222(b), requires that the Class 1 pressure retaining boundary which is not pressurized when the system valves are in the position required for normal reactor startup shall be pressurized and examined at or near the end of the inspection interval. This boundary may be tested in its entirety or in portions and testing may be performed during the testing of the boundary of IWB-5222(a). The licensee requested relief from IWB-5222(b).

- (a) Does the licensee consider the RPV flange seal as a pressure boundary? If yes, provide justification.

**NSPM Response:**

No. Under IWA-4120, "Applicability", the requirements of Article IWA-4000 do not apply to material that is not associated with the pressure retaining function of a component such as shafts, stems, trim, spray nozzles, bearings, bushings, springs, wear plates, seals, packing and gaskets.

**NRC RAI RR-(5-1)-3(b):**

Provide a detailed diagram of the RPV head flange seal leak-off lines piping and identify clearly in the diagram the boundary for which the IWB-5222(b) requirement apply and is covered by this relief request.

**NSPM Response:**

The leak-off lines consist of two 1 inch (nominal pipe size) NPS lines piped to a common temperature element. One line originates from the space between the two concentric reactor vessel closure head O-rings. The other line originates from outside the second reactor vessel closure head O-ring. The purpose of the lines is to provide

control room indication of reactor closure head O-ring leakage and to direct leakage to the reactor coolant drain tank RCST). The boundary covered by this request is from the reactor vessel flange to the 1 x 3/8 inch reducers as shown on Figure 1 below. NSPM decided to treat the leak-off lines as American Society of Mechanical Engineers (ASME) Section XI Class 1, although the site process flow diagrams indicate they are Class 2.

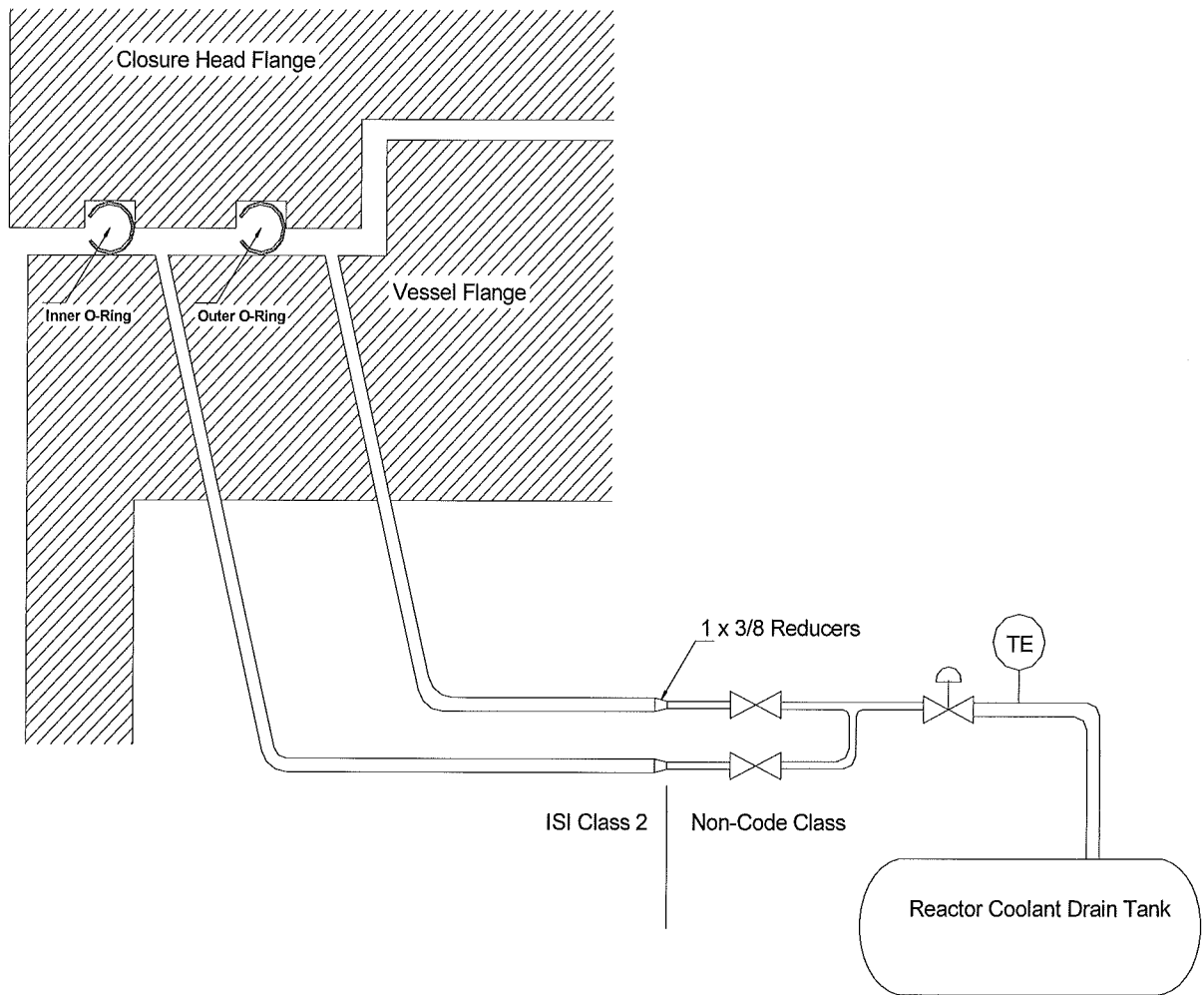


Figure 1

**NRC RAI RR-(5-1)-4:**

The licensee mentioned “excessive dose” in Section 4 of Enclosure to 1-RR-5-1 and 2-RR-5-1. Provide a total estimate for person-roentgen equivalent man (rem) exposure with consideration of an as low as reasonably achievable.

**NSPM Response:**

Performance of this pressure test would require machining, installation and removal of the plugs and would result in significant radiation exposure which is estimated at 4.5 rem per test for each unit.

**NRC RAI RR-(5-1)-5:**

Discuss whether there has been any plant specific, fleet, and industry operating experience regarding degradation of the subject piping due to known degradation mechanisms that would lead to leakage.

**NSPM Response:**

There is no known plant specific or fleet operating experience regarding the degradation of the subject piping due to known degradation mechanisms. No instances of the reactor pressure vessel flange leak-off line degradation were found through a search of the Institute for Nuclear Power Operations operating experiences website.

**NRC RAI RR-(5-1)-6:**

Discuss leakage detection capabilities at the plant. Discuss any measure(s) that would be taken to monitor and identify leakage in an unlikely event of a through wall leak in the RPV flange seal leak-off lines piping concurrent with leak or failure of the RPV flange O-ring seal during normal operation.

**NSPM Response:**

PINGP has a reactor coolant system (RCS) Leakage Monitoring Program in place that monitors both identified and unidentified leakage. Plant operators perform an RCS leak rate test on a daily basis that calculates the coolant inventory balance and records the run time for Containment Sump A, the containment humidity, and the counts from R-11 and R-12 particulate and gaseous radioactivity monitors. Along with the RCS Leakage Monitoring Program, the plant Technical Specifications state that RCS operational leakage shall be limited to: no pressure boundary leakage; 1 gallon per minute (gpm) unidentified leakage, 10 gpm identified leakage and 150 gallons per day (gpd) primary to secondary leakage through any one steam generator.

RCS leakage past the RPV flange O-rings to the RCDT would be considered identified leakage. However, through wall leakage of the RPV leak-off piping would be considered pressure boundary leakage and therefore the system would be considered inoperable.

**NRC RAI RR-(5-1)-7:**

Is any segment(s) of the RPV flange leak-off piping insulated and inaccessible for the ASME Code required VT-2 visual examination? If yes, discuss how the licensee will perform the VT-2 visual examination of the insulated and inaccessible segment(s) of the subject piping.

**NSPM Response:**

The majority of the leak-off piping is not accessible as it is under the refueling cavity floor and behind the shielding wall. Some of the underfloor piping may be partially accessible from the refueling cavity sand plug covers; however, the sand plug covers are not normally removed. The accessible segments are insulated. The inaccessible segments will not be directly examined, but examined for indication of leakage at the penetrations as required by IWA 5241 which states:

- (a) The VT-2 visual examination shall be conducted by examining the accessible external exposed surfaces of pressure retaining components for evidence of leakage.
- (b) For components whose external surfaces are inaccessible for direct VT-2 visual examination, only the examination of the surrounding area (including floor areas or equipment surfaces located underneath the components) for evidence of leakage shall be required.