WEB-BASED PROPOSED ALTERNATIVE SUBMISSION 10 CFR 50.55a(z)(2)

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Project Title:
L-PI-22-004 Prairie Island Nuclear Generating Plant Unit 2 10 CFR 50.55a Request No. RR-08, Request for Alternative to ISTC 3630(f)

Proposed Alternative Number or Identifier:
RR-08

Request Type:
10 CFR 50.55a(z)(2)

Inservice Inspection (ISI) or Inservice Testing (IST)
Inservice Testing (IST)

Requested Completion Date:
August 18, 2022

Brief Description of Proposed Alternative
Use an evaluation and monitoring plan for leakage past a pressure isolation valve (PIV) in lieu of ISTC-3630(f) until Unit 2 is in a planned refueling outage that includes vessel defueling in order to effectuate a repair or replacement.

Proposed Duration of Alternative (in terms of ISI/IST Program Interval with Start and End Dates):
The duration of this request will continue until the valve can be repaired in the next planned Unit 2 refueling outage in 2023.

Applicable ASME Code Requirements
ISTA-3300 - Corrective actions requiring repair/replacement activities shall be performed in accordance with ASME Section XI, as applicable. Other corrective actions shall be performed in accordance with the Owner's quality assurance program.ISTC-3630(e) - Leakage rate measurements shall be compared with the permissible leakage rates specified by the plant Owner for a specific valve or valve combination. If leakage rates are not specified by the Owner, the following rates shall be permissible:(1) for water, 0.5D gal/min (12.4d ml/sec) or 5 gal/min (315 ml/sec), whichever is less, at function pressure differential(2) for air, at function pressure differential, 7.5D standard ft^3/day (58d std. cc/min) whereD nominal valve size, in.d = nominal valve size, cmISTC-3630(f) - Valves or valve combinations with leakage rates exceeding the values specified by the Owner per ISTC-3630(e) shall be declared inoperable and be either repaired or replaced. A retest demonstrating acceptable operation shall be performed following any required corrective action before the valve is returned to service.

Applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (BPV Code), or ASME Operation and Maintenanceâ€¯of Nuclear Power Plants (OM Code), Edition and Addenda
ASME OM Code 2004, 2006 Addenda

Current ISI or IST Program Interval Number and Start/End Dates
5th IST Interval; started 12/21/2014 and scheduled to end 12/20/2024

Applicable ASME Code Components and/or System Description
Valve: 2SI-6-4, 21 Accumulator loop A check valve downstream of 2SI-6-3 (see figure in Attachment 1)

System: Safety Injection

Category: A (Provide isolation between the high pressure Reactor Coolant System (RCS) and the low pressure Safety Injection (SI) system; C (Open to provide flow path for accumulator Safety Injection)

Class: 1

Reason for Request
Relief request is being sought in the event of a forced outage to delay repair until the next planned refueling outage (2R33) as fixing the valve requires the reactor to be defueled and drained.

Valve 2SI-6-4 is a check valve in series with check valve 2SI-6-3 between the 21 Accumulator and the RCS Loop A Cold Leg to protect the lower design pressure Accumulator and associated piping from the higher RCS pressure during normal operation. Valve 2SI-6-4 is a non-technical specification PIV which is tested per ISTC-3630. NSPM set the leakage rate acceptance criteria for both 2SI-6-3 and 2SI-6-4 to five gallons per minute using the generic guidance of ISTC-3630(e). During the 2R32 refueling outage in October 2021, 2SI-6-4 failed the IST leakage rate testing performed with a leakage rate approximated to be 5.9 gallons per minute.

Series valve 2SI-6-3 passed IST leakage testing during 2R32, with a measured leakage rate of 0.53 gallons per minute, which is the lowest possible leak rate that can be indicated due to calibrated flow meter restrictions. Based on diverse indication, the actual 2SI-6-3 leakage was 0 gallons per minute. Therefore, the cumulative current measured leakage from high pressure RCS to the lower pressure accumulator represents min-path leakage and effectively monitors the leakage from the well performing 2SI-6-3 check valve. Further, there is no expected degradation mechanism under which the min-path leakage is expected to change during normal operation since the valves only change position if the RCS pressure is below the accumulator pressure. On that basis, NSPM evaluated the impact of the as-found leakage rate of 2SI-6-4 on Technical Specification (TS) operability and determined that it did not impact operability of the 21 SI accumulator and Unit 2 was restarted without repairing 2SI-6-4.

Therefore, NSPM is proposing an alternative to ISTC-3630(f).

Full Description of Proposed Alternative
In lieu of repair or replacement of 2SI-6-4 for the period of relief, a monitoring plan with the ability to evaluate increased accumulator leakage will be performed. This alternative will demonstrate that even though 2SI-6-4 has exceeded its individual IST leakage rate, the min-path leakage rate to the Accumulator will be maintained by 2SI-6-3 which is currently meeting the IST PIV leakage requirement.

Plant TS and procedures control maintaining accumulator level and boron concentration. Operability impacts of accumulator level increase will be evaluated as part of the corrective action program which will identify and implement any required corrective actions. Evaluations will be documented and retained in plant records and will be available for subsequent review.

Description of Basis for Use

The proposed alternative to the requirements of ISTC-3630(f) provides an acceptable level of quality and safety. The combination of the leak-tightness of the 2SI-6-3 and the implementation of an additional evaluation and monitoring plan will provide a high level of assurance that delaying the repair or replacement will not impact operability.

With respect to the 21 SI accumulator operability:

• required borated water in each accumulator is ≥ 1250 cubic feet and ≤ 1290 cubic feet in accordance with TS Surveillance Requirement SR 3.5.1.2; and

• required boron concentration in each accumulator is ≥ 2300 parts per million in accordance with TS SR 3.5.1.4.

Each accumulator is verified to be isolated and monitored every 12 hours . An adverse condition monitoring plan (ACMP) is currently in place to monitor and log the level of the 21 SI accumulator once per shift using the existing plant surveillance procedure. The site will further evaluate and use the corrective action process to monitor accumulator boron concentration should the SI accumulator level rise more than 5% in a day . A 5% rise in one day would be much less than the ASME OM Code allowable 5 gallons per minute that the PIV check valve is required to meet. Therefore, the 5% rise per day would conservatively trigger additional entries into the corrective action process, including operability evaluation, in advance of 2SI-6-3 degradation exceeding ASME allowed leakage of 5 gpm. If leakage is determined to impact operability, the corresponding Technical Specification Required Actions will be completed and Unit 2 will be shut down in order to complete repair or replacement.

NSPM proposes this alternative to allow a planned repair or replacement of 2SI-6-4 to occur when the plant is in a scheduled refueling outage as the maintenance on this valve requires the reactor to be defueled and the RCS drained. NSPM has concluded that this alternative to defer repair or replacement of 2SI-6-4 when appropriate plant conditions can be established as part of a planned and scheduled evolution provides an acceptable level of quality and safety because:

• the existing leakage is not impacting operability of the 21 SI accumulator because the current state of 2SI-6-4 has not resulted in accumulator inleakage due to non-leaking check valve 2SI 6-3 being in series ;

• accumulator level is being regularly monitored and a small increase in level is within the capability of level instrumentation to detect and will be addressed with existing procedures;

• the ACMP includes a leakage rate action threshold that is less than the Code allowable leakage on 2SI-6-4; and

• there is no expected degradation mechanism under which leakage is expected to get worse since 2SI-6-3 and 2SI-6-4 only change position in the event RCS pressure falls below accumulator pressure.

Describe Hardship or Unusual Difficulty

Repairing 2SI-6-4 will require the reactor to be defueled and drained in order to establish conditions that are safe to effectuate repair, including the establishment of dose levels that meet ALARA (as low as reasonably achievable) principles. Moving all the fuel from the reactor to the spent fuel pool and draining the reactor is resource intensive and a complex evolution. As such, hardship or unusual difficulty would result from compliance with ISTC 3630(f) before the next planned Unit 2 refueling outage. Using the provisions of this relief request as an alternative to the specific requirements of ISTC-3630(f) identified above will provide adequate indication of accumulator min-pathway performance and compliance with ISTC-3630(f) would have no compensating increase in the level of safety or quality over the proposed alternative.

Any Additional Information (submission attachments listed here)

2SI-6-4 and series valve 2SI-6-3 are PIVs that separate the higher pressure RCS from the lower pressure accumulator. 2SI-6-4 is not an Event V PIV because any leakage of RCS out of the 21 SI accumulator would be inside Unit 2 containment.

1. Attachment 1.pdf

Precedents
None

References

1. ASME OM Code 2004, 2006 Addenda
2. Technical Specifications – Unit 2