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Project Title:

10 CFR 50.55a Request Associated with the Monticello Sixth Inservice Testing Ten-Year Interval VR-01 (L-MT-21-040)

Proposed Alternative Number or Identifier:

VR-01

Request Type:

10 CFR 50.55a(z)(2)

Inservice Inspection (ISI) or Inservice Testing (IST)

Inservice Testing (IST)

Requested Completion Date:

September 23, 2022

Brief Description of Proposed Alternative

Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM"), hereby requests NRC authorization of this 10 CFR 50.55a request to support the implementation of the sixth IST ten-year interval for Monticello Nuclear Generating Plant (MNGP). Proposed Alternative No. VR-01 requests authorization for an alternative means of close testing the Control Rod Drive scram discharge header check valves. Summary of Commitments: This submittal makes no new commitments and no revisions to existing commitments.

Proposed Duration of Alternative (in terms of ISI/IST Program Interval with Start and End Dates):

This request, upon approval, will be applied to the MNGP sixth IST ten-year interval starting October 1, 2022 and is scheduled to end May 31, 2032.

Applicable ASME Code Requirements

ISTC-3510, Exercising Test Frequency, states, in part, "Active ... Category C check valves shall be exercised nominally every 3 months, except as provided by paras. ISTC-3520, ISTC-3540, ISTC-3550, ISTC-3570, ISTC-5221, and ISTC-5222." ISTC-3522, Category C Check Valves, subparagraph (a) states, in part, "Each check valve exercise test shall include open and close tests." ISTC-5221, Valve Obturator Movement, subparagraph (a)(2) states, "Check valves that have a safety function in only the open direction shall be exercised by initiating flow and observing that the obturator has traveled either the full open position or to the position required to perform its intended function(s) (see para. ISTA-1100), and verify closure."

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

American Society of Mechanical Engineers (ASME) OM Code, Operation and Maintenance of Nuclear Power Plants, 2017 Edition with no Addenda.

Current ISI or IST Program Interval Number and Start/End Dates

MNGP is currently on its fifth IST ten-year interval that is scheduled to end on September 30, 2022. The MNGP sixth IST ten-year interval begins on October 1, 2022.

Applicable ASME Code Components and/or System Description

CRD-114, Scram Discharge Header Checks Valves (Typical 121 valves, one per Hydraulic Control Unit (HCU) (Class 2)

Component/System Function

These check valves are required to open during a reactor scram, providing a flow path for the exhaust water from the Control Rod Drives (CRDs) to the Scram Discharge Volume (SDV). The check valves have no safety function in the closed direction.

Reason for Request

Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(2), an alternative is proposed to ISTC-3510, ISTC-3522, and ISTC-5221 check valve closure testing requirements for the CRD-114 scram discharge header check valves. The basis of the request is that closure testing of these valves represents a hardship without a compensating increase in the level of quality or safety.

The subject check valves, CRD-114 (scram discharge header check valves), are a simple ball-check design. There are no internal parts in the check valves that are susceptible to rapid degradation and sudden failure. In addition, the control rods are infrequently scrammed and these valves are thus subjected to few stress/wear cycles.

Full Description of Proposed Alternative

NUREG-1482, Revision 3, Section 4.4.6, "Testing Individual Scram Valves for Control Rods in Boiling-Water Reactors," provides an acceptable alternative. The NUREG states: "The NRC staff believes that those valves that must change position to provide the scram function should be included in the IST Program and should be tested in accordance with the requirements of the OM Code, Subsection ISTC, except where relief has been granted in a safety evaluation report. Bidirectional exercise testing of check valves is required by the 1996 Addenda to the OM Code (and later editions and addenda)."

NUREG-1482, Revision 3, Section 4.4.6 further states, in part, "The control rod drive system valves that perform an active safety function in scramming the reactor are the scram discharge volume vent and drain valves, scram inlet and outlet valves, scram discharge header check valves, charging water header check valves, and cooling water header check valves. With the exception of the scram discharge volume vent and drain valves, exercising the other valves quarterly during power operations could result in the rapid insertion of one or more control rods... ...for those control rod drive system valves for which testing could result in rapid insertion of one or more control rods, the rod scram test frequency identified in the facility's

TS may be used as the valve testing frequency to minimize rapid reactivity transients and wear of the control rod drive mechanisms. This alternative test frequency which is a deviation from the OM Code requirement should be clearly stated and documented in the IST Program document...”

The proper operation of these check valves is demonstrated during scram time testing. During scram time testing, scram insertion time is measured for each CRD. Monticello Nuclear Generating Plant’s (MNGPs) Technical Specification (TS) 3.1.4, “Control Rod Scram Times,” provides a specific time for individual CRD scram insertion. If a particular CRD’s scram insertion time is less than the specified time, the above check valves are functioning properly.

MNGPs TS surveillance requirement (SR) 3.1.4.1 requires verification that each control rod scram time is within the limits of TS Table 3.1.4-1, “Control Rod Scram Times,” with reactor steam dome pressure ≥ 800 psig prior to exceeding 40% Rated Thermal Power (RTP) after each reactor shutdown ≥ 120 days.

MNGP TS SR 3.1.4.2 requires verification, for a representative sample, that each tested control rod scram time is within the limits of TS Table 3.1.4-1 with reactor steam dome pressure ≥ 800 psig in accordance with the Surveillance Frequency Control Program.

The scram discharge header check valves have a safety function to open. These valves (CRD-114) must open to provide a flow path from the over-piston area of the CRD to the scram discharge header during a scram. The check valve’s closed function is to prevent backflow from the scram discharge volume (SDV) to the over-piston area of the drive when a scram is reset. Flow from the CRD to the SDV occurs throughout the entire scram stroke of the control rod and continues until volume pressure equals reactor vessel pressure. There would normally be no demand for check valve closure until after the rod is fully inserted and latched. Additionally, any condition that would require check valve closure would prevent further control rod insertion regardless of the position of this check valve. Therefore, failure of the scram discharge header check valves to close would not prevent the system from performing its safety function.

Description of Basis for Use

NSPM considers that the proper operation of each of these check valves is demonstrated during scram time testing where each CRD scram insertion time is measured. As previously discussed, MNGP TS 3.1.4 provides a specific time for CRD scram insertion. If a particular scram insertion time is less than the specified time, then the related valves are functioning properly. The successful scram time of a CRD also represents the successful full stroke exercising of these check valves (CRD-114). MNGP proposes to perform testing of the CRD scram discharge header check valves consistent with the alternative testing guidance described in NUREG-1482, Revision 3, Section 4.4.6. Therefore, the closed function of the scram discharge header check valves would not be tested as required by ISTC-3522.

Testing of the scram discharge header check valves per the requirements of ISTC-3510, ISTC-3522, and ISTC-5221(a)(2) represents a hardship without a compensating increase in the level of quality or safety pursuant to 10 CFR 50.55a(z)(2). Using the provisions of this request as an alternative to the test requirements specified in ISTC-3510, ISTC-3522 and ISTC-5221(a)(2) is an acceptable alternative method of detecting degradation of the CRD scram discharge header check valves (CRD-114) and provides reasonable assurance of the operational readiness of these valves.

Describe Hardship or Unusual Difficulty

It is not practical to perform the close exercise test. The valves are welded into the line and it is not practicable to perform a disassembly and inspection of each valve in accordance with ISTC-5221(c). There is no provision for routine access for direct visual examination of the ball and body seats or for indirect examination of internals using remote viewing aides such as a boroscope. In order to observe that the obturator has traveled would require a complete disassembly and inspection of the check valve, and an additional valve would require disassembly.

Any Additional Information (submission attachments listed here)

None.

Precedents

This request (No. VR-01) was previously approved for the fifth 10-year interval at MNGP, as documented in NRC safety evaluation dated September 26, 2012. (Reference 3)

References

1. NUREG-1482, Guidelines for Inservice Testing at Nuclear Power Plants, Revision 3, dated July 2020.
2. MNGP Technical Specifications, Surveillance Requirements 3.1.4.1 and 3.1.4.2
3. NRC safety evaluation “Monticello Nuclear Generating Plant – Relief from the Requirements of the American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants for the Fifth 10-Year Inservice Testing Program interval (TAC Nos. ME8067, ME8088, ME8089, ME8090, ME8091, ME8092, ME8093, ME8094, ME8095, and ME8096),” dated September 26, 2012. (ADAMS Accession Number ML12244A272)