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Project Title:
10 CFR 50.55a Request Associated with the Monticello Sixth Inservice Testing Ten-Year Interval VR-02 (L-MT-21-049)

Proposed Alternative Number or Identifier:
VR-02

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 Interval for Monticello Nuclear Generating Plant (MNGP). Proposed Alternative No. VR-02 requests authorization for an alternative to Residual Heat Removal (RHR) Heat Exchanger Flow Control Valve stroke timing. 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 10-year IST interval starting October 1, 2022 and is scheduled to end May 31, 2032.

Applicable ASME Code Requirements
ISTC-3100, Preservice Testing, subparagraph (e) states, "Active pneumatically operated valves (AOV) shall meet the Preservice Test requirements of Mandatory Appendix IV of this Division"; ISTC-5130, Pneumatically Operated Valves, states: "Active AOVs shall meet the requirements of Mandatory Appendix IV of this Division"; Mandatory Appendix IV, Preservice and Inservice Testing of Active Pneumatically Operated Valve Assemblies in Nuclear Reactor Power Plants, paragraph IV-3300, Preservice Testing, states, in part: "Each of the following tests shall be performed for each AOV during the preservice period: (b) a stroke test…; IV-3400, Inservice Testing, states, in part: "Each of the following tests shall be performed for each AOV: (b) a stroke test in accordance with para. IV-3420…; IV-3420,

Stroke Testing, states, in part: “Stroke testing shall be performed as follows: (a) All AOVs, within the scope of this Appendix, shall have a stroke test performed quarterly if practicable … (b) Stroke testing includes stroke time measurement as follows: (1) The limiting value(s) of full-stroke time of each valve shall be specified by the Owner.… (e) See para. IV-7100 for acceptance criteria'; IV-3510, Inservice Stroke Test Reference Values, states, in part: “…AOVs in pre-2000 plants (as defined in Subsection ISTA), inservice stroke test reference values shall be determined from the results of preservice testing. For pre-2000 plants, inservice stroke test reference values may be determined from the results of inservice testing'; IV-7100, Stroke Test Acceptance Criteria, states, in part: “Test results shall be compared to the reference values established in accordance with paras. IV-3510, IV-3520, and IV-3530”; and IV-7200, Stroke Test and Fail Safe Corrective Action, states, “If a valve fails to exhibit the required change of obturator position or exceeds the limiting values of full stroke time [see para. IV-3420(b)(1)], the valve shall be immediately declared inoperable.”

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 10-year IST interval that is scheduled to end on September 30, 2022. The MNGP sixth 10-year IST interval begins on October 1, 2022.

Applicable ASME Code Components and/or System Description

CV-1728, RHR Service Water to RHR Heat Exchanger Flow Control Valve (Class 3)

CV-1729, RHR Service Water to RHR Heat Exchanger Flow Control Valve (Class 3)

Component/System Function

These valves must open to the throttled position to regulate flow at the Residual Heat Removal (RHR) heat exchangers to maintain a differential pressure between the RHR system and the RHR Service Water (RHRSW) system to preclude the possibility of radioactive material being discharged during normal shutdown cooling or containment spray/cooling modes of operation.

Reason for Request

Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(2), an alternative is proposed to the requirements of ASME OM Code stroke timing requirements specified in Mandatory Appendix IV, “Preservice and Inservice Testing of Active Pneumatically Operated Valve Assemblies in Nuclear Reactor Power Plants,” for the subject control valves. Approval of this alternative will allow control valve testing to be performed at the Monticello Nuclear Generating Plant (MNGP) consistent with the valve’s functional requirements. The basis of the request is that stroke time testing of these valves represents a hardship without a compensating increase in the level of quality or safety.

Mandatory Appendix IV, paragraph IV-3420, Stroke Testing, requires that a limiting value of full stroke time be established for an air operated valve (AOV) and that the stroke time be measured whenever such a valve is full stroke tested. Performing full stroke time testing of these valves represents a hardship based on the control scheme design of the valves, adverse plant impact, and the functional requirements of the valves.

RHRSW valves CV-1728 and CV-1729 are air operated control valves on the outlet line of the RHRSW side of the "A" and "B" RHR heat exchangers, respectively. The valves do not have a required fail-safe position for performance of their safety function. These control valves maintain a differential pressure between the RHRSW process stream and the RHR process stream during RHRSW system operation. Failure of the valves in the open position would cause run-out of the associated RHRSW pump (if only a single pump is operating) causing pump damage. The valves are supplied with a safety-related air supply to assure that they will not fail to the open position.

The valves are controlled by a positioner, which is controlled by a differential pressure-indicating controller (DPIC). The DPIC senses pressure on the RHRSW discharge line and the RHR inlet line to the RHR heat exchanger. The desired differential pressure control point, and thus the desired valve position for system flow, is manually set by the operator. The valve positioner modulates the valve position as necessary to maintain this control point. Stroke time testing or full stroke exercising of these valves on a quarterly basis is not consistent with the design of the valve's control scheme and is not in the interest of plant safety.

These valves are interlocked to receive a closed signal when the RHRSW pumps are de-energized. This interlock is provided to ensure that system water inventory is not lost during system shutdown. Full stroke exercising of valves CV-1728 and CV-1729 when the RHRSW pumps are de-energized while possible requires RHRSW train isolation otherwise valve operation would result in the loss of liquid fill for a significant portion of the RHRSW system. Additionally, valve operation with the pumps de-energized requires the bypassing of an interlock designed to minimize the potential for water hammer. Such testing, without train isolation, increases the possibility of an adverse water hammer during startup of the RHRSW system as well as requiring filling and venting of the system following the stroke time testing. In addition to the adverse impact on plant operation, such testing could cause system or component damage.

Stroke time testing or full stroke exercising of the valves during RHRSW pump operation negates the loss of system fill concern; however, this testing would also have an adverse impact on plant safety and equipment integrity. Stroke time testing or full stroke exercising during pump operation would require the valves to be initially in the closed position during pump operation. Establishing the initial test conditions of a closed valve during pump operation would result in an undesirable deadheading of the pump. Subsequent opening of the valves to perform stroke time testing or full stroke exercising will result in pump runout if a single RHRSW pump is in operation, an undesirable condition, which adversely impacts pump integrity and performance. The pump runout concern can be addressed by full stroke exercising the valve open during operation of both RHRSW pumps; however, this exacerbates the pump deadheading concerns and would result in undesirable transients on the system and could cause system or component damage.

The RHRSW pumps are not started automatically on an ECCS initiating signal. The system must be manually started and flow established by the operator using the DPIC located in the control room. There is ample time for this system to be placed into operation following a design basis loss of coolant accident (LOCA) condition. For the design basis LOCA, the system is placed in service through operator action within 10 minutes. For the design basis fire, system initiation is assumed within 40 minutes. Based on these system initiation time frames, stroke time testing of these valves does not indicate their ability to perform the safety function described in the USAR.

Full Description of Proposed Alternative

NSPM proposes pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(2), the following alternative to the ASME OM Code requirements in Mandatory Appendix IV, paragraphs IV-3300(b), IV-3400(b), and IV-3420, Stroke Testing:

Part Stroke Exercise Quarterly
Quarterly testing of the RHRSW pumps verifies the capability of the valves to operate properly to pass the maximum required accident flow as well as the valve position (approximately 50% open) necessary to achieve required flow conditions. In addition, per paragraph IV-3420(b)(3), any abnormality or erratic action shall be recorded and an evaluation shall be made regarding need for corrective action.

Full Stroke Exercising and Valve Position Verification Every Two Years
Proper valve position indication will be verified during full stroke exercising when the associated train is isolated at least once every two years. This meets the requirements of IV-3400(e) and ISTC-3700.

Description of Basis for Use
Part Stroke Exercise Quarterly
The open safety position for the subject valves is considered to be a part open, or throttled position, based upon manual signal demand. Paragraphs IV-3420(d) and ISTC-3530 provide for demonstrating the necessary valve obturator (disk) movement by observing indirect evidence (such as changes in system pressure, flow rate, level, or temperature), which reflects change of obturator (stem or disk) position. The most representative test of the capability of valves CV-1728 and CV-1729 to perform their intended function is performed during existing inservice testing (IST) of the RHRSW pumps. Testing of the valves with quarterly testing demonstrates valve performance capability and provides a means to monitor for valve degradation by monitoring valve percent open.

Full Stroke Exercising and Valve Position Verification Every Two Years
These valves are within the scope of the OM Code Mandatory Appendix IV, "Preservice and Inservice Testing of Active Pneumatically Operated Valves Assemblies in Nuclear Reactor Power Plants." The valves are included in the Monticello Nuclear Generating Plant (MNGP) AOV Program. As such, the valves will receive a Performance Assessment Test (PAT) per IV-3300(a) and IV-3520 as a post maintenance test activity.

Using the provisions of this relief request (using existing quarterly pump testing to demonstrate proper obturator movement [quarterly part stroke], verifying required flow to demonstrate valve performance capability and an indirect means of monitoring valve degradation; and full stroke exercising and valve position verification every two years) provides a reasonable alternative to the specified Code Mandatory Appendix IV requirements. Based on the determination that the proposed alternative provides reasonable assurance of the valves' operational readiness and is an acceptable alternative method of detecting degradation, Northern States Power – Minnesota (NSPM) requests that relief be granted pursuant to 10 CFR 50.55a(z)(2).

Describe Hardship or Unusual Difficulty
Paragraphs IV-3300(e), IV-3400(e), and ISTC-3700 require performance of a position verification test. Performance of a position verification test requires the valve to be full stroke exercised open and closed. This requires the associated RHRSW train to be isolated. Train isolation requires closing the 12" manual isolation valve (RHRSW-31-1/31-2). Closure of one of these valves requires 2 operators approximately 45 minutes. Additionally, for personnel

safety, scaffolding or fall protection is required for accessing the 'A' train valve. Testing of the control valves per the requirements of IV-3300(b), IV-3400(b), and IV-3420 represents a hardship without a compensating increase in the level of quality or safety pursuant to 10 CFR 50.55a(z)(2).

Any Additional Information (submission attachments listed here)
None

Precedents
1. This relief request (No. VR-02) was previously approved for the fifth 10-year interval at MNGP, as documented in 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. (ML12244A272)

References
1. 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. (ML12244A272)