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Project Title:
10 CFR 50.55a Request Associated with the Monticello Sixth Inservice Testing Ten-Year Interval PR-05 (L-MT-21-039)

Proposed Alternative Number or Identifier:
PR-05

Request Type:
10 CFR 50.55a(z)(1)

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. PR-05 requests authorization for an alternative vibration testing range for the Standby Liquid Control (SBLC) pumps. 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
ISTB-3510, General, subparagraph (e), Frequency Response Range; states, "The frequency response range of the vibration-measuring transducers and their readout system shall be from one-third minimum pump shaft rotational speed to at least 1,000 Hz."

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

P-203A and P-203B, Standby Liquid Control (SLC) Pumps (Class 2) (Group B)

Component/System Function

The design objective of the SLC pumps is to deliver a boron solution at a sufficient concentration to the reactor and bring it to a safe shutdown condition from full power in the event of failure of the withdrawn control rods to insert.

Reason for Request

Pursuant to 10 CFR 50.55a, Codes and standards, paragraph (z)(1), an alternative to the requirement of ISTB-3510(e) is proposed for SLC pumps P-203A and P-203B vibration monitoring instrumentation. The basis of this request is that the proposed alternative would provide an acceptable level of quality and safety.

The nominal shaft rotational speed of the SLC pumps is 280 rpm, which is equivalent to approximately 4.7 Hertz (Hz). Based on this frequency and ISTB-3510(e), the required frequency response range of instruments used for measuring pump vibration is from 1.56 to 1000 Hz. Procurement and calibration of instruments to cover this range to the lower extreme of 1.56 Hz (1/3 running speed) solely to comply with OM Code requirements is unnecessary since there is no benefit to be gained.

These pumps are of a simplified reciprocating (piston) positive displacement design with rolling element bearings, Model Number TD-60, manufactured by Union Pump Corporation. Aside from oil whip in machines with sleeved bearings, there are no known failure mechanisms that would be revealed by vibration at frequencies below those related to shaft speed (4.7 Hz.). Since the SLC pumps use roller bearing, this failure mechanism is not applicable at MNGP.

Based upon the absence of a credible failure mode, no useful information is obtained by testing below the 4 Hz frequency nor will any indication of pump degradation be masked by instrumentation unable to collect data below this frequency. The requirement to measure vibration with instruments with response to 1/3 shaft speed stems from the need to detect oil whip or oil whirl associated with journal bearings. In the case of these pumps, there are no journal bearings to create these phenomena, thus satisfying the Code requirements of ISTB-3510(e) would serve no significant purpose.

The significant modes of vibration, with respect to equipment monitoring, are as follows:

- 1-Times Crankshaft Speed - An increase in vibration at this frequency may be an indication of rubbing between a single crankshaft cheek and rod end, cavitation at a single valve or coupling misalignment.
- 2-Times Crankshaft Speed - An increase in vibration at this frequency may be an indication of looseness at a single rod bearing or crosshead pin, a loose valve seat in the fluid cylinder, a loose plunger/crosshead stub connection or coupling misalignment.
- Other Multiples of Shaft Speed - An increase in vibration at other frequencies may be an indication of cavitation at several valves, looseness at multiple locations or bearing

degradation.

Full Description of Proposed Alternative
Vibration levels of the SLC Pumps P-203A and P-203B will be measured in accordance with the applicable portions of Subsection ISTB, with the exception of the lower frequency response limit for the instrumentation listed in subparagraph ISTB-3510(e). The frequency response range used for vibration measurement for the SLC pumps shall be from 4 to1000 Hz, instead of the OM Code required frequency response range of 1.56 to 1000 Hz.

Description of Basis for Use

Based on the foregoing discussion, it is clear that monitoring pump vibration within the frequency range of 4 to 1000 Hz will provide adequate information for evaluating pump condition and ensuring continued reliability with respect to the pumps' function.

Using the provisions of this request as an alternative to the requirements specified in ISTB-3510(e) provides an acceptable level of quality and safety pursuant to 10 CFR 50.55(a)(z)(1) and provides reasonable assurance of the operational readiness of SLC pumps P-203A and P-203B.

Describe Hardship or Unusual Difficulty
Not Used.

Any Additional Information (submission attachments listed here)
None.

Precedents
This request (No. PR-05) was previously approved for the fifth 10-year interval at MNGP, as documented in the NRC safety evaluation dated September 26, 2012 (Reference 1). Additionally, Duane Arnold Energy Center, January 21, 2016 (Reference 2)

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 (ADAMS Accession Number ML12244A272).

2. Duane Arnold Energy Center – Relief Request No. PR-01, PR-02, VR-01, VR-02, and VR-03 Related to the Inservice Testing Program for the Fifth 10-Year Interval (CAC No. MF5674), dated January 21, 2016 (ADAMS Accession Number ML16008A086).