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Project Title:

10 CFR 50.55a Request Associated with the Monticello Sixth Inservice Testing Ten-Year Interval OMN-26 (L-MT-22-006)

Proposed Alternative Number or Identifier:

VR-07

Request Type:

10 CFR 50.55a(z)(1)

Inservice Inspection (ISI) or Inservice Testing (IST)

Inservice Testing (IST)

Requested Completion Date:

February 28, 2023

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 Relief Request VR-07 requests to adopt American Society of Mechanical Engineers (ASME) Code Case OMN-26, 'Alternate Risk-Informed and Margin Based Rules for Inservice Testing of Motor Operated Valves [MOV].'

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

The following paragraphs and subparagraphs in Mandatory Appendix III of the ASME OM Code are affected by this Request to adopt Code Case OMN-26. Appendix III, III-3310 'Inservice Test Interval', subparagraph (c): 'The maximum inservice test interval shall not exceed 10 yr. MOV inservice tests conducted per para. III-3400 may be used to satisfy this requirement.' Appendix III, III-3700 'Risk-Informed MOV Inservice Testing'. Risk-informed MOV inservice testing that incorporates risk insights in conjunction with performance margin to establish MOV grouping, acceptance criteria, exercising requirements and testing interval may be implemented. Appendix III, Subparagraph III-3721, '[High Safety Significant Component (HSSC)] MOVs': 'HSSC MOVs shall be tested in accordance with para. III-3300 and exercised in accordance with para. III-3600 HSSC MOVs that can be operated during plant operation shall be exercised quarterly, unless the potential increase in core damage frequency (CDF) and large early release (LER) associated with a longer exercise interval is small.' Appendix III, III-3722 '[Low Safety Significant Component (LSSC)] MOVs', subparagraph (d): 'LSSC MOVs shall be inservice tested at least every 10 yr. in accordance with para. III-3310.'

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

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

Active safety related MOVs that are required by Subsection ISTC of the 2017 Edition of the ASME OM Code to be tested in accordance with Appendix III entitled "Preservice and Inservice Testing of Active Electric Motor-Operated Valve Assemblies in Water-cooled Reactor Nuclear Power Plants."

Reason for Request

In accordance with 10 CFR 50.55a(z)(1), NSPM is requesting approval to adopt OMN-26 in conjunction with implementing Mandatory Appendix III as part of the 2017 Edition of the OM Code at the MNGP.

Code Case OMN-26 better aligns the inservice test intervals in Mandatory Appendix III to the Risk and Margin Based Licensee MOV Programs developed in response to NRC Generic Letter 96-05, 'Periodic Verification of Design-Basis Capability of Safety-Related Motor Operated Valves,' that have been in effect since 1998. There is no formal technical basis in Appendix III for limiting the maximum inservice test interval to 10 years. Code Case OMN-26 establishes a structured risk-informed approach for determining inservice intervals that provides

an acceptable level of quality and safety while providing NSPM additional inservice test schedule flexibility

Full Description of Proposed Alternative

NSPM proposes to implement OMN-26 alternative risk and margin informed rules for inservice testing of MOVs in its entirety at MNGP as described below:

Proposed Alternative to III-3310(c)

The maximum inservice test interval shall not exceed 10 years unless Risk Informed Inservice Testing under the alternative provisions of Code Case OMN-26 to para. III-3700. MOV inservice tests conducted per para. III-3400 may be used to satisfy this requirement.

Proposed Alternative to III-3700

Risk-informed MOV inservice testing that incorporates risk insights in conjunction with MOV Functional Margin to establish MOV grouping, acceptance criteria, exercising requirements and test interval may be implemented.

Proposed Alternative to III-3721

HSSC MOVs shall be tested in accordance with para. III-3300 and exercised in accordance with para. III-3600 while applying the following HSSC MOV Risk insights and limitations.

- a) HSSC MOVs that can be operated during plant operation shall be exercised quarterly, unless the potential increase in core damage frequency (CDF) and large early release (LER) associated with a longer exercise interval is small.
- b) For HSSC MOVs, the maximum inservice test interval shall be established in accordance with Table 1 of OMN-26 as shown below.

Table 1

HSSC MOV – Margin Based Maximum Inservice Test Intervals

HSSC MOV Functional Margin ^(D)	Maximum Inservice Test Interval (Years)	If MOV is routinely ^(A) operated at Design Basis Pressure Conditions- Max Inservice Test Interval (Years) ^(B)
Low (< 5%)	2	4
Medium (5% and < 10%)	4	9
High (10% and < 20%)	9	9
Very High (20%)	9	12

OMN-26 Table 1 Notes:

(A) Occurs at a periodicity no less frequent than once a refueling outage.

(B) To utilize these intervals, test strokes at or exceeding design basis system conditions must be in the applicable safety function direction(s) and have no applicable operating experience, degradation, or diagnostic test anomaly with the potential for adverse impact on MOV functional margin or the capability of the MOV to perform its design basis function.

(D) For the purpose of this code case, the MOV functional margin limits apply to the As-Left MOV condition at the start of the inservice test interval and include applicable test uncertainties and allowance for service-related degradation.

Proposed Alternative to III-3722 (d)

For LSSC MOVs, the maximum inservice test interval shall be established in accordance with Table 2 of OMN-26, as shown below.

Table 2

LSSC MOV – Margin Based Maximum Inservice Test Intervals

LSSC MOV Functional Margin ^(D)	Maximum Inservice Test Interval (Years)	If MOV is routinely ^(A) operated at Design Basis Pressure Conditions- Max Inservice Test Interval (Years) ^(B)
Low (< 5%)	4	9
Medium (5% and < 10%)	9	12
High (10% and < 20%)	12	12

Very High (20%)	12	16(c)
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OMN-26 Table 2 Notes:

- (A) Occurs at a periodicity no less frequent than once a refueling outage.
- (B) To utilize these intervals, test strokes at or exceeding design basis system conditions must be in the applicable safety function direction(s) and have no applicable operating experience, degradation, or diagnostic test anomaly with the potential for adverse impact on MOV functional margin or the capability of the MOV to perform its design basis function.
- (C) Operating plants that have acquired the requisite test data to satisfy Appendix III, paragraphs III-3310(b) or III-3722(c) must complete once cycle of collecting diagnostic test data at an extended test interval, minimum 9 and maximum 12 years, before extending the test interval by engineering evaluation to the maximum 16-year test interval.
- (D) For the purpose of this code case, the MOV functional margin limits apply to the As-Left MOV condition at the start of the inservice test interval and include applicable test uncertainties and allowance for service-related degradation.

Description of Basis for Use

The requested relief to adopt OMN-26 is in line with the current Joint Owners Group (JOG) MOV Periodic Verification (PV) Test Program implemented at MNGP in response to NRC Generic Letter 96-05. Both the JOG MOV PV Program and Code Case OMN-26 provide a Risk-Margin based methodology that establishes limitations for maximum inservice test intervals for MOVs. Code Case OMN-26 simply provides a reasonable extension of this Risk-Informed philosophy based on the lessons learned and accumulated MOV performance data gathered during MOV Performance Verification Testing. Appendix III alone, isolated from OMN-26, provides no such methodology other than a maximum limit for the inservice test interval regardless of Risk or Margin.

The requested allowed maximum inservice test intervals are modest extensions with many of the Low Risk MOVs extending from 10 to 12 years (20% increase). This test interval change can be readily adopted with no loss of MOV performance and/or safety system reliability provided that no adverse performance trends are indicated. MNGP's MOV Performance Trending Governance will ensure that only MOV's with good performance history, high stable margins and no adverse diagnostic trends would be candidates for the OMN-26 based inservice test interval extensions.

The requested High Margin Maximum interval changes afforded by OMN-26 align with NSPM's desire to adopt a divisional MOV outage testing strategy that reduces the implementation burden of MOV Inservice Testing and allows greater flexibility in optimizing safety system availability. The current six and ten-year JOG Program based High-Margin Maximum Intervals do not support this strategy.

The requested relief reduces the maximum test interval for HSSC MOVs allowed by Appendix III from ten years to nine years commensurate with Risk Informed Methodology. Further under this relief request, NSPM will treat MNGP MOVs currently classified as Medium Risk by the 3-Tier JOG Risk Ranking as HSSC thereby providing more rigorous periodic verification requirements for the applicable valves especially those with less than high margin.

The requested relief takes credit for routine design basis differential pressure testing (DBDPT) of MOVs to justify extending the maximum Inservice test interval to 12 Years for Very High Margin HSSC MOVs and 16 years for Very High Margin LSSC MOVs.

With the exception of Low Risk MOVs routinely operated at design basis differential pressure (D-P) conditions, Code Case OMN-26 does not allow maximum MOV Inservice Test intervals to exceed ten years unless the associated MOVs are classified as High Margin or Very High Margin. Most High Risk MOVs are limited to four years or less for Low/Medium Margins and most Low Risk MOVs are limited to nine years or less for Low/Medium Margins. Code Case OMN-26 provides more rigorous requirements targeted specifically to Low/Medium Margin MOVs than currently allowed under Appendix III. This Risk/Margin approach is in line with accepted Risk-Informed Strategies such as the JOG MOV PV Program.

For the majority of applicable MOVs (i.e., those MOVs not subject to periodic stroking under design basis D-P conditions), the Code Case limited the scope to only High Margin Valves for extending test intervals incrementally beyond current limits:

- Test intervals for High Risk MOVs go from six to nine years
- Test intervals for Low Risk MOVs go from ten to twelve years (Note: Twelve years is aligned for all Boiling Water Reactor nuclear power plants (BWRs) with either 18- or 24- month refueling cycles).

The Table below provides a detailed comparison of the Maximum MOV Test Intervals for the JOG MOV Program, Mandatory Appendix III and Code Case OMN-26 that NSPM seeks to adopt at MNGP via this relief request. MOVs identified with **Bold and Underline** type have maximum MOV inservice test intervals exceeding the current Appendix III ten-year limit.

Table 3

MNGP Maximum MOV Test Intervals Based on Code Case OMN-26

	Maximum Inservice Test Intervals (Years)							
	HSSC MOVs				LSSC MOVs			
MOV Margin ^(H)	JOG MOV PV Program	Appendix III	OMN-26	OMN-26 w/DBDPT (F)	JOG MOV PV Program	Appendix III	OMN-26	OMN-26 w/DBDPT (F)
Low (<5%)	2	10	2 ^(A,B)	4 ^(E)	6	10	4 ^(A,C,E)	9 ^(E)
Medium (≥5% and <10%)	4	10	4 ^(A,B,E)	9 ^(E)	10	10	9 ^(A,C,E)	<u>12</u> ^(D,E)
High (≥10% and <20%)	6	10	9 ^(E)	9 ^(E)	10	10	<u>12</u> ^(D,E)	<u>12</u> ^(D,E)
Very High (≥20%)	N/A	10	9 ^(E)	<u>12</u> ^(D,E)	N/A	10	<u>12</u> ^(D,E)	<u>16</u> ^(D,E,G)
Description ->	Existing Industry Standard	Existing ASME OM Code	Relief Request	Relief Request	Existing Standard	Existing ASME OM Code	Relief Request	Relief Request

OMN-26 Table 3 Notes:

(A) Code Case Maximum Inservice Test Intervals for all Low/Medium Margin MOVs are less than or equal to current ten-year Appendix III limit. (i.e., Code Case is more conservative than Appendix III for Low/Medium Margin MOVs).

(B) Code Case Maximum Inservice Test Intervals for Low/Medium Margin HSSC MOVs are equal to the current JOG MOV PV Program limits of two/four years respectively. (Code Case intervals are aligned with JOG MOV).

(C) Code Case Maximum Inservice Test Intervals for Low/Medium Margin LSSC MOVs (four/nine years) are less than the current JOG MOV PV Program Limits of six/ten years respectively.

(D) The following four categories of MOVs have maximum inservice test intervals that exceed the current ten-year limit:

- High Margin, LSSC MOVs (12 years)
- Very High Margin, HSSC MOVs that are periodically stroked at design basis DP conditions (DBDPT) (12 years)
- Medium Margin, LSSC MOVs that are periodically DBDPT (12 years)
- Very High Margin, LSSC MOVs that are periodically DBDPT (16 years)

(E) Except for Low Margin HSSC MOVs, the Maximum MOV Inservice Test Intervals are optimized for Divisional Outage Scheduling (i.e., 4, 9, 12, 16 years). Twelve years is optimal for both BWRs and supports both 18-month and 24-month refueling outages.

(F) To utilize these intervals, test strokes at or exceeding design basis system conditions must occur at a periodicity no less frequent than once a refueling cycle, must be in the applicable safety function direction(s), and the MOV must have no applicable operating experience, degradation or diagnostic test anomaly with the potential for adverse impact on MOV functional margin or the capability of the MOV to perform its design basis function. These routine strokes during the inservice test interval are not required to be diagnostically monitored.

(G) Operating plants that have acquired the requisite test data to satisfy Appendix III, paragraphs III-3310(b) or III-3722(c) must complete one cycle of collecting diagnostic test data at an extended test interval, minimum 9 and maximum 12 years, before extending the test interval by engineering evaluation to the maximum 16-year test interval.

(H) The MOV functional margin limits apply to the As-Left MOV condition at the start of the inservice test interval and includes applicable test uncertainties and allowance for service-related degradation. The inservice test interval is uniquely established for each MOV based on margin and risk classification of the MOV.

Describe Hardship or Unusual Difficulty

NOT APPLICABLE

Any Additional Information (submission attachments listed here)

NOT USED (No Attachments)

Precedents

H.B Robinson Steam Electric Plant, Unit 2 - SER for Proposed Alternative Request IST-RR-9 Regarding the Sixth 10-Year Interval Inservice Testing Program, dated November 4, 2021 (ADAMS Accession Number ML21259A099). Braidwood Units 1 and 2, Calvert Cliffs Units 1 and 2, Clinton Power Station, RE Ginna, Limerick Generating Station Units 1 and 2, Nine Mile Point Units 1 and 2, Peach Bottom Units 2 and 3 - SER for Proposed Alternative to Utilize Code Case OMN-26, dated September 1, 2020 (ADAMS Accession Number ML20232A171).

References

1. ASME OM Code Case OMN-26, 'Alternate Risk-Informed and Margin Based Rules for Inservice Testing of Motor Operated Valves'.