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L-MT-17-071
10 CFR 50.12
10 CFR 50 Appendix R

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Monticello Nuclear Generating Plant
Docket No. 50-263
Renewed Facility Operating License No. DPR-22

Response to Request for Additional Information regarding Risk-Informed Request for Exemption from 10 CFR 50, Appendix R, III.G.2 Requirements for Multiple Spurious Operations of Drywell Spray Motor-Operated Valves (CAC No. MF9586)

References:

1) Letter from NSPM to NRC, "Risk-Informed Request for Exemption from 10 CFR 50, Appendix R, III.G.2 Requirements for Multiple Spurious Operations of Drywell Spray Motor-Operated Valves", dated April 6, 2017 (ADAMS Accession No. ML17096A599)
2) Email from NRC to NSPM, "Request for Additional Information Re: Monticello Request for Exemption from Appendix R Requirements (CAC No. MF9586; EPID L-2017-LLE-00012)", dated October 18, 2017 (ADAMS Accession No. ML17293A091)

In accordance with 10 CFR 50.12, Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, requested in Reference 1 a permanent exemption from the requirements of 10 CFR 50, Appendix R for the Monticello Nuclear Generating Plant (MNGP). Specifically, NSPM requested an exemption from 10 CFR 50, Appendix R, Section III.G.2, with respect to the physical separation of the control circuitry for the Drywell Spray Motor-Operated Valves. By email dated October 12, 2017, the NRC provided a draft Request for Additional Information (RAI) regarding NSPM's application in Reference 1. On October 18, 2017, members of the NRC staff conducted a conference call with NSPM in order to provide clarification on the draft RAIs. Subsequently, the NRC provided the final RAIs in Reference 2. The enclosure to this letter provides NSPM's response to the NRC RAIs.

If there are any questions or if additional information is required, please contact Mr. Shane Jurek at (612) 330-5788.

Summary of Commitments

This letter makes no new commitments and no revisions to existing commitments.

Christopher R. Church
Site Vice President, Monticello Nuclear Generating Plant
Northern States Power Company – Minnesota

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
Resident Inspector, Monticello, USNRC

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

RISK-INFORMED REQUEST FOR EXEMPTION FROM 10 CFR 50, APPENDIX R, III.G.2 REQUIREMENTS FOR MULTIPLE SPURIOUS OPERATIONS OF DRYWELL SPRAY MOTOR-OPERATED VALVES

On April 6, 2017, Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, submitted a request for a permanent exemption for the Monticello Nuclear Generating Plant (MNGP). Specifically, NSPM requested an exemption from the requirements of 10 CFR 50, Appendix R, Section III.G.2 with respect to the physical separation of the control circuitry for the Drywell Spray (DWS) Motor-Operated Valves (MOVs). By email dated October 18, 2017, the NRC requested the following additional information. The response to this request for additional information (RAI) is provided below.

RAI 1

Enclosure 1 Section 3.4.3 of the exemption request provides an assessment of safety margins and concludes that sufficient safety margins are maintained. However the assessment only addresses the design and installation of the shorting switches and not the performance-based assessment supporting the exemption request.

Provide technical information to support that the performance-based aspects of safety margins meet the guidelines specified in Regulatory Guide 1.174, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis,” Section C.2.1.2, “Safety Margin.”

NSPM Response

The performance-based aspects of safety margins meet the guidelines specified in Regulatory Guide (RG) 1.174, Section C.2.1.2, if the following are true:

- Codes and standards or their alternatives approved for use by the NRC are met.
- Safety analysis acceptance criteria in the licensing basis are met or proposed revisions provide sufficient margin to account for analysis and data uncertainty.

Sufficient safety margins are demonstrated by the design, operation, and performance monitoring of the shorting switches. The shorting switches will provide a low impedance path to ground in the event of a hot short and will not impact the operation of the Residual Heat Removal (RHR) system. Because operation of RHR at MNGP currently meets all applicable codes and standards (except the established noncompliance with 10 CFR 50, Appendix R, Section III.G.2), granting the exemption will not affect NSPM’s ability to demonstrate compliance with all applicable codes and standards. Additionally, because NSPM currently meets the safety analysis acceptance criteria established in the MNGP Updated Safety Analysis Report (USAR), the USAR acceptance criteria will continue to be met.

Furthermore, sufficient safety margins are maintained in the probabilistic risk assessment (PRA) model used to support the exemption request. The following summarizes the bases for ensuring the maintenance of sufficient safety margins:

- NSPM maintains a fire protection program at MNGP that meets 10 CFR 50, Appendix R.

- The fire PRA model is developed in accordance with NUREG/CR-6850, "Fire PRA Methodology for Nuclear Power Facilities", which was jointly developed between the NRC and the Electric Power Research Institute.

- The internal events PRA and fire PRA have received formal industry peer reviews based on the Nuclear Energy Institute guidelines in order to ensure the models and documentation meet the appropriate quality standards of ASME/ANS RA-Sa-2009, "Addenda to ASME/ANS RA-S-2008 Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications", and RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities". All upgrades to the models have been peer reviewed per the ASME/ANS RA-Sa-2009 standard.

- Fire modeling has been performed within the fire PRA utilizing codes and standards developed by industry and NRC staff which have been verified and validated in authoritative publications, such as NUREG-1824, "Verification and Validation of Selected Fire Models for Nuclear Power Plant Applications". In general, the fire modeling has been performed using methods and input parameters that are based upon NUREG/CR-6850 as documented in the Main Control Room Analysis, Single Compartment Analysis, and Multi-Compartment Analysis Notebooks.

Based on the limitations of the fire testing currently available, it cannot be assumed that the shorting switches will preclude all postulated hot shorts. However, based on the conclusions drawn in NUREG/CR-6931, "Cable Response to Live Fire (CAROLFIRE)", regarding intra- and inter-cable hot shorts, NSPM has precluded the most likely event (i.e., an intra-cable hot short). NSPM has conservatively accounted for any remaining uncertainties in its PRA analysis by assuming a failure probability of 1.0E-03 for the shorting switches. The NRC has previously found the likelihood of the conditions required to fail a shorting switch to be insignificant (References 1 and 2). Accordingly, NSPM's assumed failure probability for the shorting switches is conservatively high. Despite the conservatively high failure probability, the PRA analysis described in the initial application found that the risk associated with continued operation in the proposed manner is very small in accordance with the limits identified in RG 1.174. NSPM is protected against the most probable failure mechanism and the PRA identifies that, despite the inability to preclude all postulated hot shorts, the increase in risk is very small.

Therefore, NSPM maintains safety margins per the guidelines specified in RG1.174, Section C.2.1.2, by ensuring that performance-based aspects are consistent with the applicable codes, standards, and regulations and by continuing to meet the safety analyses acceptance criteria.

RAI 2

Enclosure 1 Section 3.4.5 of the exemption request states that a performance-based monitoring program will be established for the shorting switches in accordance with Appendix R programmatic requirements. However, no description of this program was provided nor an implementation schedule. Provide the following:

Question 2.1

Describe the status of the development of this monitoring program and the schedule for implementation.

NSPM Response

Preventive Maintenance (PM) tasks are being generated for the shorting switches to ensure acceptable resistance. An analysis has been completed to establish the acceptance criterion for the shorting switch resistance measurements, which are described more fully in NSPM's response to subsequent questions. NSPM will include the PM tasks in the MNGP Appendix R program within 180 days of receipt of the exemption. Initial resistance measurements will support development of the initial PM frequency.

Question 2.2

Provide a brief summary of the monitoring program and how it meets the Appendix R programmatic requirements.

NSPM Response

10 CFR 50, Appendix R does not prescribe explicit maintenance requirements for fire protection-related structures, systems or components (SSCs). Rather, the MNGP Appendix R program recognizes other programs and processes to ensure the availability of in-scope SSCs. Because 10 CFR 50, Appendix R would not otherwise require it, NSPM will introduce performance monitoring of the shorting switches into the MNGP Appendix R program. The objective of the monitoring program is to ensure the shorting switches provide a low impedance path to ground in the event of a fire-induced hot short.

To ensure the shorting switches are able to provide a low impedance path to ground, NSPM will utilize the PM program to periodically assess the resistance across the shorting switches installed for MO-2020 and MO-2021. An acceptance criterion has been established as described more fully in the response to Question 2.3. If the resistance measurements exceed the acceptance criterion, NSPM will enter the issue into and follow its corrective action program (CAP). The results of the resistance measurements will be used to adjust the measurement frequency in accordance with the PM program.

Question 2.3

Describe the performance criteria and explain why this criteria is appropriate for the shorting switch application.

NSPM Response

The proper functioning of the shorting switches is dependent on maintaining the integrity of the switches and associated components (e.g., terminal blocks and conductors) necessary to maintain the continuity of the shorting path. The shorting switch is a passive electrical component which will not normally carry electric current. It is installed in a location and in a manner to ensure that it cannot be inadvertently disconnected from the terminal strips. Therefore, the only degradation mechanism is an increase in resistance across the shorting path. If a hot short were to occur when increased resistance across the shorting path exists, it would result in a larger voltage across the open coil which could potentially induce a spurious operation of the associated MOV.

As described in NSPM's response to Question 2.2, the resistance across the shorting switches will be measured. NSPM has completed an analysis to determine the performance criterion. Specifically, the analysis determined the maximum allowable resistance across the shorting path to ensure the voltage across the open coil is insufficient for the coil to pick up. Conservative assumptions were made in the calculation such as:

- Assuming a starter pick up voltage lower than the lowest measured by NSPM in a sample of over 60 coils in this type of GE motor starter;
- Using the highest Motor Control Center (MCC) voltage allowed by procedure;
- Assuming that the hot short occurs at the MCC in order to minimize the resistance of the fault path and maximize the resistance of the shorting switch path; and
- Ignoring fault current dissipated through other parallel circuit paths.

The maximum allowed shorting switch resistances were calculated for each valve individually for both intra-cable and inter-cable hot shorts. The lowest allowable resistance value of the four will be applied as the acceptance criterion for the resistance measurements.

Question 2.4

Explain how trending of degradation and failures will be assessed, and the process for identifying and implementing corrective actions.

NSPM Response

Existing processes within the PM program will be used to assess trending of degradation and failures. The resistance measurement values will be recorded in the work packages and

reviewed in aggregate by appropriate personnel. Degradation of shorting switch performance will be assessed by the appropriate personnel. In accordance with the PM Program, if NSPM identifies that an adverse trend exists, it will be entered into the CAP; otherwise the increase in resistance will be monitored for future changes. NSPM maintains a CAP that meets the requirements of 10 CFR 50, Appendix B and will utilize the CAP for implementing corrective actions, as appropriate.

References

1. Letter from NRC to TVA, “Issuance of Amendments Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program in Accordance with 10 CFR 50.48(c)”, dated October 28, 2015 (ADAMS Accession No. ML15212A796)

2. Letter from NRC to Entergy, “Issuance of Amendment Regarding Transition to a Risk-Informed, Performance-Based Fire Protection Program in Accordance with 10 CFR 50.48(c)”, dated October 7, 2016 (ADAMS Accession No. ML16223A481)