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U S Nuclear Regulatory Commission
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Prairie Island Nuclear Generating Plant Units 1 and 2
Dockets 50-282 and 50-306
License Nos. DPR-42 and DPR-60

Supplement to Responses to Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems", (TAC Nos. MD7866 and MD7867)

References:
1. Nuclear Regulatory Commission (NRC) Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems", dated January 11, 2008, Accession Number ML072910759.
2. Northern States Power Company, a Minnesota corporation (NSPM), letter to NRC, "Nine-Month Response to NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems'", dated October 14, 2008, Accession Number ML082880483.
3. NSPM letter to NRC, "Ninety-Day 2R25 Post-Outage Report Pursuant to Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems.'", dated January 30, 2009, Accession Number ML090300705.
4. NRC letter to NSPM, "Request for Additional Information Related to Response to Generic Letter (GL) 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems', (TAC Nos. MD7866 and MD7867)", dated September 28, 2009, Accession Number ML092650134.

The NRC issued Generic Letter (GL) 2008-01 (Reference 1) to request that each licensee evaluate the licensing basis, design, testing, and corrective action programs for the Safety injection (SI), Residual Heat Removal (RHR), and Containment Spray (CS) systems to ensure that gas accumulation is maintained less than the amount that challenges operability of these systems, and that appropriate action is taken when conditions adverse to quality are identified. NSPM provided responses to GL 2008-01 in References 2 and 3.

The NRC staff determined that additional information is needed to complete its review of the NSPM responses to Generic Letter (GL) 2008-01 for the Prairie Island Nuclear Generating Plant (PINGP) provided in References 2 and 3. Enclosure 1 to this letter provides the NSPM responses to the NRC requests for additional information provided in Reference 4.

If there are any questions or if additional information is needed, please contact Mr. Dale Vincent, P.E., at 651-388-1121.

Summary of Commitments

This letter contains no revisions to existing commitments. NSPM makes the following new commitment:

> Industry resolution of the gas accumulation Technical Specification (TS) issues will be monitored and, if necessary, a license amendment request will be submitted within one year following NRC approval of the Technical Specification Task Force Traveler (TSTF) or consolidated line item improvement process (CLIIP) Notice of Availability, that is consistent with resolution of the generic changes process.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on NOV 24 2009

Mark A. Schimmel
Site Vice President, Prairie Island Nuclear Generating Plant Units 1 and 2
Northern States Power Company - Minnesota

Enclosures (1)

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

The NRC staff determined that additional information is needed to complete its review of the Northern States Power Company – Minnesota (NSPM) responses to Generic Letter (GL) 2008-01 for the Prairie Island Nuclear Generating Plant (PINGP) provided in letters dated October 14, 2008 (Accession Number ML082880483) and January 30, 2009 (Accession Number ML090300705). The NRC staff requests for additional information (shown in bold) and NSPM responses follow.

1. **Clarify the schedule for submitting a license amendment request (LAR), if it is necessary to submit an LAR as a result of the evaluation of the Technical Specification Task Force traveler.**

NSPM response:

NSPM makes the following commitment:

Industry resolution of the gas accumulation Technical Specification (TS) issues will be monitored and, if necessary, a license amendment request will be submitted within one year following NRC approval of the Technical Specification Task Force (TSTF) traveler or consolidated line item improvement process (CLIIP) Notice of Availability that is consistent with resolution of the generic changes process.

2. **In Reference 5, it was reported that several voids were found that resulted in systems conditions being evaluated as "operable but nonconforming." Clarify how operability is determined, including a description of criteria used, analyses performed, and consideration of the size of the void and how it affects the system in all modes of operation.**

NSPM response:

The approach described in the following response has been applied in the evaluations performed for GL 2008-01 as documented in the corrective action program.

Operability of systems with known voids is determined differently depending on whether the voids are on the suction or discharge side of a pump. For suction side voids, void fraction at the pump inlet has been evaluated based on the guidance provided in NUREG/CR-2792 and NEI APC 09-20. For voids that are expected to transport to the pump prior to pump start, additional evaluations are performed to determine the effect of the void when the pump is started. For discharge side voids, evaluations are performed to determine the effect of the void on the system, including both internal pressure effects on the piping and components, and external loading (that is, water hammer) affects on piping and hanger structural capacities. Residual Heat Removal (RHR) and Safety Injection (SI) system voids in ECCS piping are also evaluated to determine total void volume to the core, if applicable.

Both suction and discharge void analyses include conservatism to account for changes in void volume due to pressure and temperature condition changes between the values when the void was discovered and the expected values (for example, normal Refueling Water Storage Tank (RWST) water level versus minimum or maximum RWST water level). These void volume adjustments are based upon ideal gas law equations. In many cases, only the injection phase of a loss-of-coolant-accident (LOCA) is applicable for analysis of the void's effect on the system. Most of the piping in the normal Emergency Core Cooling System (ECCS) flow path experiences flow rates that would result in the void flushing through the piping and into the reactor vessel very quickly after initial pump start during a LOCA. Voids in portions of the system not utilized during ECCS injection are evaluated for the conditions they would experience in other accident modes or normal operation.

Suction side voids are evaluated using a flow rate that is within current plant procedures and system capability that results in the worst case void fraction at the pump inlet. Transportability is determined based upon Froude number and system configuration. Void volume is adjusted, in addition to the temperature and pressure adjustments discussed previously, based on the change in pressure from the current void location to the pump suction due to elevation changes. Void fraction at the pump inlet is determined in different ways based upon the void volume. Simple calculations using the initial void fraction and adjusting for pressure to determine the final void fraction at the pump inlet are used initially to determine if additional analysis is needed. This simple analysis conservatively assumes the void and water move together to the pump suction. Actual void transport typically occurs due to friction caused by differential flow rates between the water and gas and results in the void being spread out over a longer length than its original length. More advanced computer analyses are performed when the simple calculations show the void fraction is over the acceptable criteria.

Discharge side voids are first evaluated to determine if they are susceptible to rapid pressure fluctuations based upon system configuration in all applicable modes of operation. Voids in portions of the systems that are isolated and would not experience rapid pressure fluctuations are not evaluated for water hammer. Voids that will experience rapid pressure fluctuations are evaluated for water hammer using simple calculations or computer analyses. Conservative pump pressures and startup rates are used to maximize water hammer pressures and forces. The forces generated by the analysis are evaluated based on hanger configuration and capacities to determine if the loads are acceptable. Peak pressure is compared to system design pressure to determine acceptability.

NSPM is continuing to follow industry activities related to void transport analysis, pump acceptance criteria, and water hammer evaluations and will adjust operability evaluation methodologies and acceptable criteria as appropriate based upon industry guidance and lessons learned.

3. **In Reference 4, it is stated that the licensee's "CAP [Corrective Action Program] process requires that a potentially nonconforming condition be documented in the CAP. This would be the case should an as-found measured void size fail[s] to meet its acceptance criterion. The Shift Manager would review the CAP to evaluate for potential impact on operability and reportability." Clarify the meaning of "potentially nonconforming" and "potential impact", including any criteria used in the determination. Describe follow-up actions to be taken when a void is identified as nonconforming and documented in the CAP.**

NSPM response:

The term "potentially nonconforming" relates to whether the measured void volume and location meets current design and licensing basis requirements. The term "potential impact" refers to the unknown consequence of the void at the time of discovery. After the void is found, its location is reviewed to determine if the void could affect the system if the system were required to perform its specified safety function. If the void is in a portion of a system that is normally isolated and not required to perform a safety function, then the void is considered to have no impact on the larger safety function of that system. If the void is exposed to a normal flow path, then further evaluations of the void are performed as discussed in the response to Question 2, above, to determine the impact of the void.

At this time, the PINGP design and licensing basis does not explicitly include any allowance for voids in piping and any void found has been considered a nonconformance until it is removed from the system. NSPM is currently in the process of developing void transport analyses for suction piping and water hammer analyses for discharge piping that will determine allowable void volumes and locations. When these analyses are complete, a void found in system piping will initially result in the system being considered "potentially nonconforming" until the void volume and location is compared to the analyzed conditions. If the void volume and location is within the limitations of the analyzed conditions then the system will be considered operable and no corrective actions will be required.

When a void is discovered, initial corrective actions include venting and flushing as appropriate based on system configuration and plant status. Voids that remain after initial corrective actions are evaluated for prompt operability as discussed previously. After the system is declared operable, it is considered operable but nonconforming and the void is monitored periodically to determine if void volume is stable. Voids that show growth past the limits evaluated will be reevaluated for system operability and to determine if additional corrective actions are necessary. Periodic monitoring continues until the void is removed or analysis is completed to show the void is acceptable as-is.

4. **Training was not identified in the Generic Letter (GL), but is considered to be a necessary part of applying procedures and other activities when addressing the issues identified in the GL, as the licensee has recognized. Provide a brief description of training.**

NSPM response:

The NRC GL did not require discussion of training to satisfy the 10CFR 50.54(f) request and therefore none was provided in the NSPM response for PINGP. However, when any plant procedure is modified, an assessment for training needs and change management is required in accordance with the Procedure Processing Procedure. The determination is typically a function of the nature of the change and the perceived impact on the organization. If required, this training is generally accomplished prior to, or in parallel with, the issuance of the procedure. For fill and vent, and flushing procedure revisions, the changes have generally been minor and have been considered enhancements.

NSPM is an active participant in the Nuclear Energy Institute (NEI) Gas Accumulation Team, which is currently coordinating with the Institute of Nuclear Power Operations (INPO) in the development of generic training modules for gas accumulation and management. These training modules target the Engineering, Operations, and Maintenance disciplines. When the training modules are completed and become available to the industry, NSPM will evaluate them for applicability to PINGP, and may implement a version tailored to meet plant needs. Pending release of the INPO products, the schedule for such planned training has not yet been determined. Training Module 1, issued by INPO, has been entered into the training request process.

5. **In Reference 4, it is stated that "Design features and water level set points are controlled by design and operating procedures to prevent vortex effects that can potentially introduce gas into the system during design basis events". Since flow rates under realistic accident conditions (non-degraded pumps, two trains running) may significantly exceed the design basis accident flow rates, clarify how the stated conclusions are applicable to actual expected accident conditions and for all modes of operation.**

NSPM response:

Design basis accident flow rates that are used for determining vortexing affects are based on non-degraded pumps and are conservatively high as compared to the maximum flow rate of the pump. These calculations use the appropriate number of pumps for the timeframe inside the accident. For instance, for the RHR and SI common outlet from the RWST, one SI pump and one RHR pump are assumed to be running as the tank minimum level is approached. Procedurally the second RHR and SI pumps are secured when the 33% level is reached in the tank.

The calculations that are in place to preclude vortexing are based on the conditions that will give the highest probability of vortexing using the procedurally aligned pumps. These conditions are applicable in all modes where the ECCS and CS systems are required to be operable and are bounding for realistic accident conditions concerning vortexing and air ingestion.

6. In Reference 4, it is stated that "PINGP does not have specific leakage acceptance criteria for leakage between high pressure and low pressure systems pertaining to gas intrusion." Reference 3 states "Gas in discharge piping can be an indicator of potential backleakage from high-pressure sources such as accumulators or the RCS ..." Clarify whether a gas leakage acceptance criterion will be developed or justify that existing procedures and criteria are able to control gas intrusion. Include consideration of the effects of leakage on the pressures of the systems involved; the accumulator, reactor cooling system, emergency core cooling system piping.

NSPM response:

NSPM has committed to develop and implement interim surveillance measures to periodically verify the piping is sufficiently full such that its functional requirements are maintained (NSPM letter to NRC dated September 28, 2009, Accession Number ML092730109). This commitment will be completed by the end of the fourth quarter 2009 for Unit 2 and the end of the second quarter 2010 for Unit 1.

Corrective actions in response to GL 2008-01 are in progress, and as a result, final corrective actions have not been determined at this time. NSPM may develop specific leakage acceptance criteria; however, NSPM may implement other effective solutions which mitigate gas accumulation from leakage. These may include periodic surveillance via ultrasonic testing and/or venting, system trending, or other appropriate actions as identified by NSPM or other industry activities.