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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

Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"

References:
1. NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" dated January 11, 2008.
2. Nuclear Management Company, LLC, letter to NRC, re: Update to Three-Month Response and Request for Extension to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," dated September 15, 2008.

The Nuclear Regulatory Commission (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) system, Residual Heat Removal (RHR) system, and Containment Spray (CS) system, 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.

GL 2008-01 requested each licensee to submit a written response in accordance with 10 CFR 50.54(f) within nine months of the date of the GL to provide the information summarized below:

"(a) A description of the results of evaluations that were performed pursuant to the requested actions;
(b) A description of all corrective actions, including plant, programmatic, procedure, and licensing basis modifications that were determined to be necessary to assure compliance with the quality assurance criteria in Sections III, V, XI, XVI, and XVII of Appendix B to 10 CFR Part 50 and the licensing basis and operating license as those requirements apply to the subject systems; and,

1717 Wakonade Drive East • Welch, Minnesota 55089-9642
Telephone: 651.388.1121

(c) A statement regarding which corrective actions were completed, the schedule for completing the remaining corrective actions, and the basis for that schedule."

The enclosure to this letter contains the Northern States Power Company, a Minnesota corporation (NSPM) 9-month response to NRC GL 2008-01.

Summary of Commitments

This letter contains new commitments and no revisions to existing commitments. The new commitments are identified in Section B of the enclosure.

I declare under penalty of perjury that the foregoing is true and correct. Executed on OCT 14 2008

Michael D. Wadley
Site Vice President
Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, Prairie Island, USNRC
Resident Inspector, Prairie Island, USNRC

ENCLOSURE

NINE-MONTH RESPONSE TO NRC GENERIC LETTER 2008-01, "MANAGING GAS ACCUMULATION IN EMERGENCY CORE COOLING, DECAY HEAT REMOVAL, AND CONTAINMENT SPRAY SYSTEMS"

This enclosure contains the Northern States Power Company, a Minnesota corporation, (NSPM) nine month response to NRC Generic Letter (GL) 2008-01 "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," dated January 11, 2008. In GL 2008-01, the NRC requested "that each addressee evaluate its emergency core cooling system (ECCS), decay heat removal system, and containment spray system licensing basis, design, testing, and corrective actions 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."

The following information is provided in this response:

a) A description of the results of evaluations that were performed pursuant to the requested actions (see Section A of this enclosure),

b) A description of the corrective actions determined necessary to assure compliance with the quality assurance criteria in Sections III, V, XI, XVI, and XVII of Appendix B to 10 CFR Part 50 and the licensing basis and operating license with respect to the subject systems (see Section B of this enclosure), and

c) A statement regarding which corrective actions have been completed, the schedule for the corrective actions not yet complete, and the basis for that schedule (see Section B of this enclosure).

The following systems were determined to be in the scope of GL 2008-01 for the Prairie Island Nuclear Generating Plant (PINGP):

- Safety Injection (SI)
- Residual Heat Removal (RHR)
- Containment Spray (CS)

A. EVALUATION RESULTS

Licensing Basis Evaluation

NSPM reviewed the PINGP licensing basis with respect to gas accumulation in the SI, RHR, and CS. This review included the Technical Specifications (TS), TS Bases, Updated Safety Analysis Report (USAR), Technical Requirements Manual (TRM) and Bases, responses to NRC generic communications, Regulatory Commitments, and License Conditions.

1. Summarize the results of the review of these documents:

The above documents and regulatory commitments were evaluated for compliance with applicable regulatory requirements. The following changes were determined to be needed to address weaknesses or deficiencies in meeting regulatory requirements or commitments:

The PINGP TS do not have a TS surveillance requirement (SR) to verify the subject suction and discharge piping are sufficiently full of water. NSPM will develop a TRM with specific requirements to periodically verify the RHR, SI, and CS piping are sufficiently full of water. The locations for potential voiding will be determined by evaluation of the results of the GL 2008-01 activities. The TRM will verify the systems can fulfill their functional requirements.

A description of the periodic surveillance for the TRM is described in Testing Section 1.

The PINGP USAR does not specify that SI, RHR, or CS piping be maintained "full" or "water solid". Changes to the USAR will be made due to the specific requirements being incorporated into the TRM and plant procedures as a result of the GL 2008-01 activities.

2. Summarize the changes to licensing basis documents (Corrective Actions):

NSPM has not made any changes to PINGP licensing basis documents as a result of evaluations performed for this GL response. However, PINGP will develop a TRM and plant procedures for the specific requirements (e.g., suction locations, discharge locations, void size limits) to ensure the subject systems remain functional.

TS improvements are being addressed by the Technical Specifications Task Force (TSTF) to provide an approved TSTF traveler for making changes to individual licensee's TS related to the potential for unacceptable gas accumulation. The development of the TSTF traveler relies on the results of the evaluations of a large number of licensees to address the various plant designs. NSPM is continuing to support the industry and NEI Gas Accumulation Management Team activities regarding the resolution of generic TS changes via the TSTF traveler process. NSPM will evaluate the resolution of TS issues with

respect to the changes contained in the TSTF traveler to determine applicability and further assess any changes to the TS and TS Bases.

3. **Provide a detailed list of items that have not been completed, a schedule for their completion, and the basis for that schedule.**

TABLE 1		
Activity Not Complete	**Schedule for Completion**	**Basis for Schedule**
Develop a TRM with specific requirements to periodically verify the RHR, SI, and CS piping are sufficiently full of water.*	2009 3rd quarter (Unit 2) and 2010 2nd quarter (Unit 1)	Incorporate walkdown results (from unit outages). Provides time to implement TRM change and associated procedure changes.
Evaluate the resolution of TS issues with respect to the changes contained in the TSTF traveler to determine applicability and further assess any changes to the TS and TS Bases.*	180 days after final approval of TSTF	Requires a completed TSTF and a reasonable amount of time to evaluate.

* Committed to in Section B, below.

Design Evaluation

NSPM reviewed the PINGP design basis with respect to gas accumulation in the SI, RHR, and CS. This review included Design Basis Documents, Calculations, Engineering Evaluations, and Vendor Technical Manuals.

1. **Discuss the results of the review of the design basis documents. This discussion should include a description of any plant specific calculations or analyses that were performed to confirm the acceptability of gas accumulation in the piping of the affected systems, including any acceptance criteria if applicable. Note: This should describe the "as found" (pre Generic Letter) condition prior to any corrective or enhancement actions.**

   NSPM reviewed the PINGP design basis with respect to gas accumulation in the subject systems. Various design basis documents were reviewed including design guidelines, calculations, engineering evaluations, design change packages, design basis documents and vendor technical requirements.

   Design drawings provide sufficient detail regarding placement of vent, drain or test connections to fill and vent systems during return to service. These details can also be used to adequately vent (e.g., dynamic flush) during refill operations for system piping that cannot be statically vented. NSPM will evaluate the need for additional vent valve locations as part of the piping walkdown activities. The

results of the walkdown activities will be reported in the post-2R25 90-day follow-up letter.

Design change procedures were reviewed to determine if they had detailed design review issue checklists to provide necessary guidance to determine if the changes introduce or increase the potential for gas accumulation. As a result, it was noted that the design review procedure was inadequate with respect to this consideration. NSPM will revise the design review procedure to include appropriate guidance.

PINGP does not employ keep full systems to automatically maintain the subject systems in a filled and vented configuration.

The design of the subject systems does not include specific voided piping as part of the design, except for RHR pump suction piping from the containment recirculation sump, the containment sump B strainer piping high point, and the CS pump discharge piping downstream of the outboard containment isolation valves to the CS spray ring riser and header inside containment. The RHR containment sump B suction piping between the two motor-operated isolation valves was evaluated to be acceptable based on configuration and manual operation of the sump recirculation switch over process, the opening of the suction valves with the resulting compression of the void size, and the displacement of the air back to the sump during the relatively long opening stroke time of the suction valves (approximately 120 seconds). The containment sump B suction high point was evaluated to be acceptable based on the water flow rates in the sump and the buoyancy of the air void preventing significant air ingestion by the RHR suction pipe in the sump pit. The fill time of the CS downstream of the discharge isolation valve to a dry header inside containment has been evaluated to be acceptable and not susceptible to water hammer or other adverse effects.

Realignments during design basis events have been evaluated to be acceptable for system operability with a system that is kept sufficiently full. Containment sump strainer performance, including debris laden suction geometry, vortexing, and flashing has been evaluated and was provided to the NRC under separate correspondence as response to GL 2004-02.

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. The CS caustic standpipe is discussed in Section 10 of this enclosure as a vulnerability that was not previously evaluated for potential vortex effects to the CS pumps.

PINGP does not have specific leakage acceptance criteria for leakage between high pressure and low pressure systems pertaining to gas intrusion. A leakage criterion used for boundary valve testing controls the allowable leakage and reduces the potential for gas intrusion.

2. **Discuss new applicable gas volume acceptance criteria for each piping segment in each system where gas can accumulate where no acceptance criteria previously existed and summarize the Corrective Actions, and schedule for completion of any Corrective Actions.**

Evaluation by the Pressurized Water Reactor Owners Group (PWROG) Program

a) Pump Suction Piping

The interim criteria for allowable gas accumulation in the pump suction piping are based on limiting the gas entrainment to the pump after a pump start. A PWROG program established interim pump gas ingestion limits to be employed by the member utilities. These interim criteria are used by PINGP to evaluate the effects of potential gas accumulation on pump operation.

PINGP procedures will be changed or developed to provide assurance that the volume of gas in the pump suction piping for the subject systems is within the interim criteria from the above PWROG program or other suitable analyses.

These conservative interim criteria have been applied in support of system operability until further data supports a change. This criteria used in conjunction with other factors such as net positive suction head required (NPSHR), duration of gas flow, and transients for which the system is credited provide a basis for system operability.

b) Pump discharge piping which is susceptible to pressure pulsation after a pump start.

Gas accumulation in the piping downstream of the pump to the first closed isolation valve or the RCS pressure boundary isolation valves will result in amplified pressure pulsations after a pump start. The subsequent pressure pulsation may cause relief valves in the subject systems to lift, or result in unacceptable pipe loads, i.e., axial forces that are greater than the design rating of the axial restraint(s).

NSPM will use plant specific information for piping restraints and relief valve set points in the subject systems to determine the acceptable gas volume accumulation such that relief valve lifting in the subject systems does not occur and pipe loading is within acceptable limits, i.e., axial forces that are less than the design rating of the axial restraint(s).

NSPM will establish applicable limits for gas accumulation at the identified susceptible void locations in the RHR, SI and CS discharge piping. The susceptible void locations are being determined by drawing reviews and piping walkdowns. PINGP procedures will be developed to provide assurance that gas in the subject systems discharge piping is limited to

within the interim criteria determined by the specific application of the Joint Owner's Group program method or other suitable analyses.

c) Pump discharge piping which is not susceptible to water hammer or pressure pulsation following a pump start.

1. The PWROG methodology for CS evaluates the piping response as the CS header is filled and compares the potential force imbalances with the weight of the piping. The net force resulting from the pressurization of the CS header during the filling transient is a small fraction of the dead weight of the filled piping, and therefore the filling transient is well within the margin of the pipe hangers.

   The PINGP CS discharge header piping was evaluated using the PWROG methodology described above. Using this methodology it was determined that the force imbalances on the CS discharge header piping are well within the margin of the pipe hangers.

2. A PWROG methodology has been developed to assess when a significant gas-water waterhammer could occur during switchover to hot leg injection and a depressurized RCS. PINGP does not have hot leg injection because it is an upper plenum injection plant design. This methodology cannot be applied to the PINGP SI system because SI flow to upper plenum injection may be established when the RCS is not depressurized.

d) RCS Allowable Gas Ingestion

The PWROG qualitatively evaluated the impact of non-condensable gases entering the RCS on the ability on the post-accident core cooling functions of the RCS. This evaluation assumed that five cubic feet of non-condensable gas at 400 psia and 68 degrees F was present in the SI piping concurrent with five cubic feet of non-condensable gas at 100 psia at 68 degrees F in the RHR piping. The qualitative evaluation concluded that the quantities of gas that will not prevent the ECCS from performing its core cooling function.

PINGP procedures will verify that gas accumulation in the RHR and SI systems are within the PWROG criteria for RCS allowable gas ingestion.

3. Summarize the changes, if any, to the design basis documents (Corrective Actions) and the schedule for completion of the Corrective Actions.

PINGP has not made changes to the design basis documents as a result of GL 2008-01 activities. PINGP anticipates that changes may be necessary to incorporate the methodologies discussed in Design Section 2 into the design basis when they are no longer interim guidance.

4. Discuss the results of the system P&ID and isometric drawing reviews to identify all system vents and high points.

The piping and isometric drawings for the SI, RHR and CS were reviewed to identify vents, high points and susceptible void locations. Specifically, the following flow paths were reviewed:

- SI flow path
  - RWST to SI pump suction
  - SI pump to RCS cold legs and reactor vessel upper plenum injection
- RHR and recirculation flow path
  - RWST to RHR pump suction
  - Containment sump to RHR pump suction
  - RCS hot legs to RHR suction
  - RHR pump discharge to reactor vessel upper plenum injection
  - RHR pump discharge to SI pump suction and CS pump suction
  - RHR pump discharge to RCS cold leg
- CS flow path
  - RWST to CS pump suction
  - CS pump discharge to the motor operated isolation valves

Each flow path was reviewed line by line to identify system vents, high points and susceptible void locations. The system lines included branch lines, valve bodies, pump casings, heat exchangers, and improperly sloped piping. In addition, pipe diameter transitions in horizontal lines that could trap gas such as pipe reducers and orifices were included.

Screening criteria were applied to identify susceptible void locations. The screening criteria are as follows:

- Is the line a local high point?
- Is the slope of the line adverse as measured by the GL 2008-01 walkdowns (i.e., > ¼ inch that could locally form a void)?
- Does the line vent to a riser?
- Is there potential for gas intrusion in the line?
- Is it a dead end tee?
- Is there continuous flow in an orifice?

Each line that did not screen out was reviewed to determine if it could be effectively vented with an existing system vent or procedure. Horizontal line slope, horizontal line local high point information, and vent orientation details will be obtained from field walkdowns. The results of the walkdown activities will be reported in the post-2R25 90-day follow-up letter.

Several locations were identified as susceptible void locations based on the drawing reviews. They were:

- SI pump discharge cross-tie (Unit 1 only)
- Abandoned in place boric acid storage tanks supply line to the SI pump common suction
- RWST supply line to the CS pumps common suction
- RHR pump cross-tie upstream of the RHR heat exchangers
- RHR pump cross-tie downstream of the RHR heat exchangers
- RHR flush line connection to the RHR pump cross-tie downstream of the RHR heat exchangers (i.e., dead end tee)
- Accumulator fill line from the SI cold leg injection line

Several locations were deemed susceptible because of the extensive industry operating experience.

- The RHR cross-tie to the SI pump suction and the RHR cross-tie to the CS pump suction.
- The RHR cross-tie to the CS pump suction.

Physical walkdowns performed during and after 2R25 will measure horizontal pipe slope and compare the configuration to the piping and isometric drawing reviews to identify susceptible void locations. NSPM will evaluate the susceptible void locations by the methodologies discussed in Design Section 2 and ultrasonic techniques will be used to quantify void size.

As identified in the NSPM 3-month response update to NRC GL 2008-01, NSPM will perform walkdowns of piping not accessible during power operation in the PINGP Unit 1 containment and the RHR pump pits during the next Unit 1 Refueling Outage (1R26).

5. Identify new vent valve locations, modifications to existing vent valves, or utilization of existing vent valves, based on the drawing review, and summarize the Corrective Actions, and schedule for completion of the Corrective Actions.

NSPM drawing reviews identified susceptible void locations that are locations for potential plant modifications. However, the information is not definitive and a decision to modify the plant will be based on the drawing reviews combined with GL 2008-01 activities and the walkdown results. The specific piping sections associated with the susceptible void locations will be used to identify locations that may require vents. The design change process will determine the exact number and location of vents. NSPM will identify corrective actions to minimize gas accumulation and its consequences for Unit 1 outside containment accessible areas and Unit 2 inside and outside containment and the Unit 2 RHR pit areas in the 90-day 2R25 post-outage report. NSPM will identify corrective

actions to minimize gas accumulation and its consequences for Unit 1 inside containment and the Unit 1 RHR pit areas in the 90-day 1R26 post-outage report.

6. **Discuss the results (including the scope and acceptance criteria used) of the system confirmation walkdowns that have been completed for the portions of the systems that require venting to ensure that they are sufficiently full of water.**

   2R25 walkdowns inside containment and RHR pit areas are being performed for piping susceptible to gas intrusion. NSPM will provide these results and the results of the outside containment walkdowns for Unit 1 and 2 in the 90-day 2R25 post-outage report.

   As committed to in the NSPM update to the 3-month response to NRC GL 2008-01, NSPM will provide the results of the walkdowns of the Unit 1 RHR pit area and the Unit 1 inside containment 90 days after 1R26.

7. **Identify new vent valve locations, modifications to existing vent valves, or utilization of existing vent valves, that resulted from the confirmatory walkdowns, and summarize the Corrective Actions, and the schedule for completion of the Corrective Actions, i.e., the walkdowns that have been completed, and the walkdowns not yet complete (refer to Reference [5] Three-Month Response to NRC Generic Letter 2008-01).**

   2R25 walkdowns inside containment and the RHR pit areas are being performed during 2R25. The walkdown information and the drawing review information will be evaluated together to determine the need for additional corrective actions as discussed in Design Section 5. NSPM will present these results and the results of the outside containment walkdowns of piping sections for Unit 1 and 2 in the 90-day 2R25 post-outage report

   NSPM will perform Unit 1 walkdowns for inside containment and RHR pit areas during 1R26. The walkdown information and the drawing review information will be evaluated together to determine the need for additional corrective actions as discussed in Design Section 5. The walkdown results will be presented in the 90-day 1R26 post-outage report.

8. **Discuss the results of the fill and vent activities and procedure reviews for each system (Note that routine periodic surveillance testing is addressed in the "Testing Evaluation" section of this template).**

   Following significant maintenance activities, maintenance work orders are used to refill the subject systems. These maintenance work orders coupled with procedures provide the means to fill and vent the subject systems as well as purge air and other non condensable gases from associated piping and components. Following refueling outages, surveillance procedures for full flow testing dynamically vent the RHR and SI systems.

NSPM reviewed procedures used to vent the subject systems' piping of void formation attributable to fill and vent activities, or due to component malfunction. Maintenance work orders for static vent and full flow test surveillance procedures that dynamically vent the RHR and SI systems adequately fill and vent the subject systems.

NSPM evaluated the fill and vent procedures to determine if the sequence of steps was effective and whether or not they provided adequate venting criteria. In each case, the sequence of steps was found to be effective. As a result of the reviews, venting criteria for some activities will be clarified, and venting termination guidance in some procedures will be enhanced.

NSPM evaluated the fill and vent procedures to determine if venting of instrument lines was included. It was found that system venting for the RHR system was addressed in the fill and vent for that system. The fill and vent procedures for the other systems will be revised to include guidance for addressing instrumentation lines.

NSPM evaluated the application of fill and vent maintenance procedures to system restoration following maintenance. The maintenance procedures were found to be "pump suction centric". This focus and need for additional attention to the entire system return to service was documented in the corrective action process.

The procedure reviews also considered dynamic venting and vacuum fill considerations. PINGP does not currently use vacuum fill for fill and vent of the subject systems. Dynamic venting and void removal by fluid flow in the subject system piping was evaluated. Evaluations verifying adequate flow for gas "sweeping" will be formalized and documented. NSPM will state in the procedure purpose for procedures that perform RHR and SI check valve testing (e.g., SP 1092A) that they also dynamically vent the RHR and SI systems. These procedures will explicitly recognize their dynamic vent capability. NSPM will ensure that these outage procedures will be scheduled appropriately as a post-maintenance verification for activities in an outage that may introduce voids into the systems.

NSPM also determined that the fill and vent procedures provided appropriate validation methods to provide assurance that systems are sufficiently full of water.

9. **Identify procedure revisions, or new procedures resulting from the fill and vent activities and procedure reviews that need to be developed, and summarize the Corrective Actions, and schedule for completion of the Corrective Actions. (Note that routine periodic surveillance testing is addressed in the "Testing Evaluation" section of this template).**

NSPM will clarify acceptance criteria for venting activities and enhance venting guidance in procedures.

NSPM will revise procedures to include guidance for addressing instrumentation lines.

10. Discuss potential gas intrusion mechanisms into each system for each piping segment that is vulnerable to gas intrusion.

NSPM identified the following potential gas intrusion mechanisms:

1. Leakage from the accumulators

   Tie-in points from the accumulators into the SI systems have been identified to ensure venting capability should a leakage path develop resulting in degassing from the accumulators. Piping segments within these systems at elevations higher than the accumulator tie-in points have been evaluated by drawing reviews. Plant walkdowns inside containment are being performed for Unit 2 during 2R25. Unit 1 walkdown is scheduled for 1R26. NSPM will evaluate the need to add additional vents based on the drawing reviews and walkdowns performed during 2R26 and 1R26.

2. Gas accumulated in the RHR heat exchangers

   During reduced inventory operation, gas could accumulate in the RHR heat exchanger. PINGP dynamically vents the RHR heat exchanger tubes during subsequent full flow RHR check valve testing.

3. Vortexing in Refueling Water Storage Tank (RWST)

   NSPM licensing basis requires a minimum remaining water volume above the vortex limit with margin at completion of manual switchover to containment recirculation sump. Operators are trained and tested to meet this licensing commitment. The SI and RHR pumps no longer take suction from the RWST after completion of manual switchover; therefore, gas intrusion from the RWST is not credible.

   The CS pump continues to deplete RWST inventory after initiation of switchover until 8 percent RWST level is reached signaling the completion of the RWST mission time. The CS pump is shutdown at this point. The CS pumps have been analyzed to complete their required function before unacceptable vortexing within the RWST can occur.

4. Vortexing in the CS Caustic Standpipe

   The CS pump depletes RWST inventory after initiation of switchover until 8 percent RWST level. This signals the completion of the CS injection via the RWST. The CS pumps have been evaluated for vortexing concerns when aligned to the RWST. However, the CS standpipe supply to the CS pumps have not been evaluated for vortexing or air injection potential. NSPM will complete a formal evaluation.

5. Containment recirculation sump strainer geometry

Strainer performance testing addressing debris laden strainer geometry and vortexing have been performed. RHR realignments during design basis events were evaluated and determined to be acceptable for system operability with a system that is kept full per the criteria listed in the response to Design Criteria Item 2. Containment sump strainer performance, including debris laden suction geometry, vortexing and flashing has been evaluated and was provided to NRC under separate correspondence addressing the supplemental response to Generic Letter 2004-02.

11. Ongoing Industry Programs

Ongoing industry programs are planned in the following areas which may impact the conclusions reached during the GL response Design Evaluation of PINGP relative to gas accumulation. NSPM will monitor these activities to determine if additional changes to the PINGP design may be required or desired to provide additional margin.

- Gas Transport in Pump Suction Piping

NSPM understands that the PWROG has initiated testing to provide additional knowledge relative to gas transport in large diameter piping. One program performed testing of gas transport in 6-inch and 8-inch piping. Another program will perform additional testing of gas transport in 4-inch and 12-inch low temperature systems and 4-inch high temperature systems. This program will also integrate the results of the 4-inch, 6-inch, 8-inch and 12-inch testing.

- Pump Acceptance Criteria

NSPM understands that long-term industry tasks were identified that will provide additional tools to address GL-2008-01 with respect to pump gas void ingestion tolerance limits.

12. Provide a detailed list of items that have not been completed, a schedule for their completion, and the basis for that schedule.

TABLE 2		
Activity Not Complete	**Schedule for Completion**	**Basis for Schedule**
Develop procedures to provide assurance that gas in the subject systems discharge piping is limited to within the acceptance criteria.	Consistent with TRM change – see Table 1	Consistent with TRM change – see Table 1

TABLE 2		
Activity Not Complete	**Schedule for Completion**	**Basis for Schedule**
Revise design change procedures to provide guidance to determine if the changes introduce or increase potential for gas accumulation.	Six months	Low likelihood a modification would be a problem in six months.
Develop procedures to provide assurance that five cubic feet of non-condensable gas at 400 psia and 68 degrees F was present in the SI piping concurrent with five cubic feet of non-condensable gas at 100 psia at 68 degrees F in the RHR piping.	Consistent with TRM change – see Table 1	Consistent with TRM change – see Table 1
Identify corrective actions to minimize gas accumulation and its consequences for Unit 2 inside and outside containment and the Unit 2 RHR pit areas.*	90-day post 2R25 outage	In time for required response to NRC
Identify corrective actions to minimize gas accumulation and its consequences for Unit 1 inside containment and the Unit 1 RHR pit areas.*	90-day post 1R26 outage	In time for required response to NRC
Clarify acceptance criteria for some venting activities, and enhance venting termination guidance in some operating procedures.	Consistent with TRM change – see Table 1	Consistent with TRM change – see Table 1
Revise fill and vent procedures to include guidance for addressing instrumentation lines.	Consistent with TRM change – see Table 1	Consistent with TRM change – see Table 1
Complete a formal vortexing evaluation of the CS caustic standpipe suction to the CS pumps.*	Six months	Informal evaluation lends confidence and consistent with other priorities.

* Committed to in Section B, below.

Testing Evaluation

1. **Discuss the results of the periodic venting or gas accumulation surveillance procedure review.**

   PINGP TS do not have a requirement to perform a surveillance procedure, nor is one performed otherwise, to periodically check for potential gas accumulation from the subject systems.

   As discussed in the Licensing Section 1, NSPM will develop a TRM and associated surveillance procedure to periodically UT the subject systems and vent as necessary. The surveillance procedure will:

   - quantify the gas accumulation
   - have acceptance criteria
   - require entry into the CAP when gas accumulation is identified
   - sample to identify the type of gas accumulation
   - verify that the piping is sufficiently full of water for each system
   - not pre-condition by other surveillance procedures such that the system is filled by the previous testing activity prior to the venting surveillance
   - trend results for each vent location to confirm that the systems are sufficiently full of water and that the venting frequencies are adequate

2. **Identify procedure revisions, or new procedures resulting from the periodic venting or gas accumulation surveillance procedure review that need to be developed, and summarize the Corrective Actions, and schedule for completion of the Corrective Actions.**

   NSPM will modify quarterly pump and valve tests either via scheduling or in content to preclude preconditioning.

   NSPM will identify precursors indicative of gas accumulation in a procedure (e.g., periodic gas accumulation surveillance associated with the TRM). Actions to be taken for each precursor indication will be specified to verify that subject system piping is sufficiently full of water.

   These actions will be completed to coincide with the implementation of the periodic gas accumulation surveillance.

3. **Discuss how procedures adequately address the manual operation of the RHRS in its decay heat removal mode of operation. Include how the procedures assure that the RHRS is sufficiently full of water to perform its decay heat removal safety function (high point venting or UT) and how pump operation is monitored by plant personnel (including a description of the available instrumentation and alarms).**

   The procedure for Unit 1 RHR operation states: during a unit cooldown, the RHR system should be placed in operation when the primary coolant temperature and

pressure have been reduced to below 350 degrees F and 425 psig. Prior to initiating Phase II Cooldown on a unit shutdown, the RHR suction line pressure will be checked and, if voided, the hot leg suction piping will be re-filled via the RWST. This guidance was provided by a procedure change circa 1999. The Unit 2 RHR operating procedure will be revised to incorporate this guidance.

The procedure for RHR operation at RCS reduced inventory provides guidance to monitor the RHR pumps and liquid level. In preparation for draining the procedure has steps that specify the instrumentation used to monitor the plant.

For example:

Verify the following level instruments are in service:

- A and B Train ERCS DP Level
- A and B Train Ultrasonic
- Refueling Canal Level Instrument

and

The Reduced Inventory display interfaces with RHR SYSTEM TROUBLE alarm window, which would indicate one of the following alarming parameters on the display:

- Hi/Low RHR Flow
- Low RHRP Motor Amps
- Low RHRP Suction Pressure
- High RCS Temperature
- High RCS Level
- Low RCS Level

The procedure for RHR full flow check valve testing requires a minimum of 1800 gpm. This procedure is an outage activity scheduled as systems are restored and after any operation at RCS mid-loop. The flow provides a flush of the RHR system suction and discharge pipe. It will continue to be performed after outage activities that may have introduced air into the system. NSPM will state in the procedure purpose for procedures that perform RHR and SI check valve testing (e.g., SP 1092A) that they also dynamically vent the RHR and SI systems. These procedures will explicitly recognize their dynamic vent capability. NSPM will ensure that these outage procedures will be scheduled appropriately as a post-maintenance verification for activities in an outage that may introduce voids into the systems.

4. **Summarize the results of the procedure reviews performed to determine that gas intrusion does not occur as a result of inadvertent draining due to valve manipulations specified in the procedures, system realignments, or incorrect maintenance procedures.**

During the initial phases of a LOCA, the containment sump fills and the liquid pool at the bottom floor of containment is established. This fills the piping between the sump and RHR MOV closest to containment.

The procedure for transfer to recirculation from the RWST opens the sump MOVs prior to starting the associated RHR pump. The RHR pump is not started until both MOVs in the associated suction line are full open. The sump MOVs have a relatively long stroke time of approximately 120 seconds. The pipe from the sump is a horizontal run with a slight downward slope from the sump to the containment side MOV. During the valve stroke the water will move under the valve seat and displace the exposed air. The displaced air will vent back towards the sump. As the valve continues to stroke open, more of the air will vent back towards the sump.

PINGP experience evaluating GL 2008-01 issues has not identified testing, maintenance or operational procedures that inadvertently caused draining due to valve alignments. Maintenance activities on SI, RHR and CS systems that can introduce a void by breaching the system are evaluated to specify the appropriate restoration by the work planner using Work Management Instructions.

5. **Describe how gas voids are documented (including the detection method such as venting and measuring or UT and void sizing and post venting checks), dispositioned (including method(s) used such as static or dynamic venting), and trended, if found in any of the subject systems.**

Susceptible void locations will be evaluated in accordance with a TRM TSR as discussed in Licensing Section 1. The associated surveillance procedure will specify acceptance criterion for the void size based on its location. UT will be used to quantify the void size. The as found void size will be compared to the acceptance criterion. Contingencies to resolve a potential void include:

- Static fill and vent
- Dynamic fill and vent
- Vacuum fill and vent
- Evaluate and document acceptance of the void size and its impact on the system functionality

After contingency venting for an identified void, UT may not necessarily be performed when solid stream fluid flow from the vent is confirmed.

A CAP will be initiated for all voids identified as discussed in Testing Section 1.

6. **Provide a detailed list of items that have not been completed, a schedule for their completion, and the basis for that schedule.**

TABLE 3		
Activity Not Complete	**Schedule for Completion**	**Basis for Schedule**
Develop a TRM and associated surveillance procedure to periodically vent the subject systems (Refer to licensing Table 1).*	See Table 1	See Table 1
Modify quarterly pump and valve tests either via scheduling or in content to preclude preconditioning.	180 days	Low likelihood of a problem in 180 days.
Identify precursors indicative of gas accumulation in a procedure (e.g., periodic gas accumulation surveillance associated with the TRM). Actions to be taken for each precursor indication will be specified to verify that subject system piping is sufficiently full of water.*	Consistent with TRM change – see Table 1	Consistent with TRM change – see Table 1
Complete the review to determine the reason for the difference between the Unit 1 and Unit 2 procedures for placing RHR in operation for Phase II Cooldown on a unit shutdown.	Prior to 1R26	Next refueling outage
Incorporate into outage planning the full flow check valve testing (that dynamically vents the RHR and SI systems) following restoration of the RHR and SI systems and any RCS reduced inventory operation.*	Prior to 1R26	Next refueling outage
Evaluate susceptible void locations in accordance with a TRM as discussed in Licensing Section 1. The associated surveillance procedure will specify acceptance criterion for the void size based on its location. UT will be used to quantify the void size.	Consistent with TRM change – see Table 1	Consistent with TRM change – see Table 1

* Committed to in Section B, below.

Corrective Actions Evaluation

1. **Summarize the results of the reviews regarding how gas accumulation has been addressed at your site.**

   The NSPM CAP is used to document gas intrusion/accumulation issues as potential nonconforming conditions.

   The CAP 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 to meet its acceptance criterion. The Shift Manager would review the CAP to evaluate for potential impact on operability and reportability.

Therefore, the NSPM review concluded that issues involving gas intrusion/accumulation will be properly prioritized and evaluated under the CAP.

2. Provide a detailed list of items that have not been completed, a schedule for their completion, and the basis for that schedule.

This information is provided in the Licensing, Design and Testing Sections. Actions will be completed under the commitments noted above. Commitment tracking at PINGP is done within the action request system (PASSPORT).

B. DESCRIPTION OF NECESSARY CORRECTIVE ACTIONS (COMMITMENTS)

The following commitments were determined to be necessary to assure compliance with the applicable regulations (schedules for these actions are identified in Section A):

1. NSPM will develop a Technical Requirements Manual Surveillance Requirement to periodically verify the piping is sufficiently full such that its functional requirements are maintained.

2. NSPM will evaluate the resolution of TS issues with respect to the changes contained in the TSTF traveler to determine applicability and further assess any changes to the TS and TS Bases.

3. NSPM will identify corrective actions to minimize gas accumulation and its consequences for Unit 1 outside containment accessible areas and Unit 2 inside and outside containment and the Unit 2 RHR pit areas in the 90-day 2R25 post-outage report.

4. NSPM will identify corrective actions to minimize gas accumulation and its consequences for Unit 1 inside containment and the Unit 1 RHR pit areas in the 90-day 1R26 post-outage report.

5. NSPM will complete a formal evaluation of vortexing in the caustic addition standpipe.

6. NSPM will state in the procedure purpose for procedures that perform RHR and SI check valve testing (e.g., SP 1092A) that they also dynamically vent the RHR and SI systems. These procedures will explicitly recognize their dynamic vent capability. NSPM will ensure that these outage procedures will be scheduled appropriately as a post-maintenance verification for activities in an outage that may introduce voids into the systems.