ATTACHMENT (1)

CCNPP NINE-MONTH RESPONSE TO GENERIC LETTER 2008-01

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This attachment contains the Calvert Cliffs Nuclear Power Plant (CCNPP) nine-month response to Generic Letter (GL) 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems."

The following information is provided in this response:

a) A description of the results of evaluations that were performed pursuant to the actions requested by the generic letter. This description includes information to demonstrate 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.

b) A description of any corrective actions we determined necessary to ensure 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 systems, 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.

The following systems were determined to be in the scope of the generic letter for CCNPP:

- Safety Injection (SI) system
- Shutdown Cooling (SDC) system
- Containment Spray (CS) system
- Relevant flow path in the charging system when used for high pressure safety injection (HPSI)

For the purposes of this submittal, the term Emergency Core Cooling System (ECCS) refers to the combination of the SI and SDC systems. The relevant portion of the charging system includes that piping used for providing a HPSI flow path for hot leg injection via pressurizer spray post-loss-of-coolant accident (LOCA). The ECCS, CS, and the portion of the charging system noted above are hereinafter referred to as "the subject systems" when referenced collectively.

We have evaluated the accessible portions of the subject systems that perform the functions described in GL 2008-01 and have concluded that these systems are Operable, as defined in our Technical Specifications. Further, the subject systems are in conformance with our commitments to the applicable draft General Design Criteria (GDC), as stated in our Updated Final Safety Analysis Report. As committed in Reference (1), we will complete the evaluation of the inaccessible portions of these systems by startup from the next scheduled refueling outages at Units 1 and 2 and will provide a supplement to this response within 90 days after each Unit's respective scheduled refueling outage.

A. EVALUATION RESULTS

1. Licensing Basis Evaluation

   The CCNPP licensing basis was reviewed with respect to gas accumulation in the subject systems. This review included the Technical Specifications (TS), TS Bases, UFSAR, and the Technical Requirements Manual, responses to Nuclear Regulatory Commission (NRC) generic communications, NRC commitments, and license conditions. The review determined that the quality assurance requirements and design criteria applicable to gas management in the subject systems, as discussed in the "Applicable Regulatory Requirements" section of GL 2008-01, are maintained. There are no known periodic venting requirements in our current licensing basis.

There were no weaknesses or deficiencies in meeting regulatory requirements or commitments identified. Therefore, no corrective actions were determined necessary to ensure compliance with the applicable quality assurance criteria of 10 CFR Part 50, Appendix B, our licensing bases, or our operating license with respect to the subject systems.

a. Technical Specifications:

We do not have a Surveillance Requirement in our Improved Technical Specifications (ITS) requiring us to verify ECCS piping is full of water. Calvert Cliffs ITS was developed from the applicable Combustion Engineering Improved Standard Technical Specification (NUREG-1432). Amendment Numbers 227 (Unit 1) and 201 (Unit 2) converted our old Technical Specifications to the Improved Standard Technical Specifications consistent with the provisions of NUREG-1432, Revision 1. Surveillance Requirement 3.5.2.3 was not included in our old Technical Specifications (it was not required per our existing plant-specific licensing basis) and therefore the Surveillance Requirement was not added to our ITS. Surveillance Requirement 3.5.2.3 was bracketed in NUREG-1432, identifying it as a requirement that could be changed based on plant-specific design, analyses, or licensing basis (reference Nuclear Energy Institute 96-06, Section 2.7).

Technical Specification improvements related to the potential for adverse gas accumulation are being addressed by the Technical Specification Task Force (TSTF). We are continuing to support the industry TSTF and Nuclear Energy Institute Gas Accumulation Management Team activities regarding resolution of this generic TS issue. It is premature at this time to proceed with a license amendment request to address gas accumulation issues. Following NRC approval of the TSTF traveler, we will evaluate resolution of any TS issues with respect to the elements contained in the TSTF, and consider submitting an appropriate license amendment request for CCNPP.

b. Technical Specification Bases:

As discussed in our TS Bases, the active ECCS components, along with the passive safety injection tanks and refueling water tank (RWT), provide the cooling water necessary to meet draft GDC 44 [ECCS Capability (Category A)]. The Limiting Condition for Operation helps to ensure that the acceptance criteria established by 10 CFR 50.46 for ECCS will be met following a LOCA. The CS system is designed to the requirements in draft GDC 58, 59, 60, 61, 62, 63, 64, and 65.

c. Technical Requirements Manual:

The Technical Requirements Manual does not currently address gas accumulation issues.

d. UFSAR:

As discussed in our UFSAR, a construction permit was obtained on July 7, 1969, to construct both Calvert Cliffs Units 1 and 2. The final GDC were not available at that time. The final GDC were not used to establish the principal design criteria for Calvert Cliffs. Calvert Cliffs was designed and constructed to meet the intent of the draft GDC. Modifications to the facility are evaluated in accordance with 10 CFR 50.59 to assess consistency with the current licensing basis (including the draft GDC, as applicable). Descriptions of the design basis for the subject systems are contained in the UFSAR. These descriptions do not specifically address requirements for water filled piping.

e. Correspondence:

A search of regulatory correspondence related to the issues addressed in GL 2008-01 was performed. No regulatory correspondence, in addition to those referenced in this document, was identified.

f. Regulatory Commitments:

A search of regulatory commitments related to issues addressed in GL 2008-01 was performed. No specific regulatory commitments were identified.

g. Corrective Actions:

No corrective actions were determined necessary to ensure compliance with the applicable quality assurance criteria of 10 CFR Part 50, Appendix B, our licensing bases, or our operating license with respect to the subject systems. However, as discussed in paragraph 1a, a TSTF traveler may be necessary to reflect an improved understanding achieved during the review of industry responses to the GL. We will evaluate the need to modify our TS based on the TSTF traveler, should it be approved.

2. Design Evaluation

a. Design Basis Document Review:

Review of the design basis documents (including calculations and engineering evaluations) and vendor technical manuals, with respect to gas accumulation in the subject systems (ECCS, CS, and the relevant flow path in the charging system when used for HPSI) are summarized below. No corrective actions were determined necessary to ensure compliance with the applicable quality assurance criteria of 10 CFR Part 50, Appendix B, our licensing bases, or our operating license with respect to the subject systems as a result of the design review. Note, however, that design-related corrective actions were identified as a result of reviews performed as discussed in paragraphs 2b and 2c.

The design of the subject systems was predicated on these systems being sufficiently fluid filled to ensure that the pumps can operate and deliver fluid at design flow rates. The original design incorporated numerous vent valves at high point locations in the piping to assist with venting. Design documentation requires that there is sufficient net positive suction head available to preclude pump cavitation under design bases normal and accident scenarios. High and low pressure systems are sufficiently separated to ensure that back leakage is limited. Instrumentation is also provided to aid in back leakage identification.

The effects of minor air entrainment into the HPSI pumps, due to vortexing from the RWT and emergency containment sump during design bases accidents, were considered, evaluated, and found acceptable. Any accumulated gas found in the subject systems piping during walkdowns was evaluated and dispositioned using appropriate site and engineering principles and processes.

There are no specific design requirements for periodic venting of the subject systems. The original design incorporated numerous vent paths and connections to aid venting of the subject systems. Venting of the subject systems is accomplished by following processes described in station procedures.

There are no automated keep-fill provisions incorporated into the design to keep any portion of the subject systems piping completely filled with water.

The pumps for the subject systems are located in the Auxiliary Building basement (-15 foot basement floor nominal elevation). The pump suctions are connected to the RWT or emergency containment sump, both of which are located at the necessary elevation to ensure that the subject systems remain adequately full of water and that, by design, adequate net positive suction head is available to support pump operability.

The potential for vortexing from the RWT leading to air ingestion into the HPSI and CS pumps taking suction from the RWT, was evaluated. Calculations were performed to predict maximum flow rates that might pass through the RWT outlet headers at minimum, pre-recirculation actuation signal and post-recirculation actuation signal RWT water levels. The results were used as inputs to other calculations using NRC-approved methodology to predict the air-ingestion levels entering the suction of the HPSI and CS pumps. The calculations predicted some air ingestion levels, however correspondence with the pump vendors indicated that the conservatively estimated void fractions do not prevent the HPSI and CS pumps from performing their required safety functions. The evaluation concluded that vortexing does not challenge the functionality of the HPSI and CS pumps.

The subject systems are separated from their higher pressure interfaces via in-series check valves and/or closed isolation valves. The likelihood of the higher pressure system leaking back to the lower pressure system and releasing entrained gas is minimal. Additionally Control Room alarms would alert the operator if leakage were to occur from the Reactor Coolant System (RCS) back through the SI check valves (if alarm setpoints are exceeded).

The effect of gas transported to the RCS during the injection phase of an accident was evaluated. Per the evaluation, as much as 171 scf (44 cu ft @ 58 psia) of gas trapped in the low pressure safety injection (LPSI) piping and potentially carried into the RCS was found to have no adverse effects on the emergency core cooling function. The gas trapped in the LPSI line does not affect the core flushing function if it is initiated post-LOCA. A small amount of gas would be flushed to the reactor vessel head and would not affect the core flushing flow. Similarly, the LPSI system would remain capable of performing its SDC safety-related function. The 171 scf was a theoretical volume of gas based on no venting of discharge piping and no credit taken for dynamic flushing. No quantitative evaluation was performed to evaluate dynamic transients (water hammer) that might be associated with this volume present during a LOCA.

As discussed, some discrete evaluations have been performed; however, an engineering evaluation bounding all possible consequences of a maximum, acceptable, predetermined void size for any given location has not been performed. In the few instances where we did find some amount of accumulated gas at the high point location in the piping of the subject systems, evaluations were completed to assess the as-found conditions (see paragraphs 2b and 2d).

Revisions to station engineering procedures governing the design control program have been drafted to ensure the issues identified in the subject GL are adequately addressed.

b. System Piping and Instrument Diagrams and Isometric Drawing Review:

System piping and instrument diagrams and isometric drawings were reviewed to identify system vents and high points. Single-line elevation drawings were developed for the piping under the scope of this GL. As a result of the system piping and instrument diagrams and isometric drawing review, two corrective actions were determined necessary to ensure compliance with the applicable criteria specified in the GL with respect to the subject systems. These two corrective actions determined that vents should be added to the CS system (one vent in 11 CS Header and one vent in 21 CS Header) because the locations cannot be dynamically filled due to their unique design configurations. These two corrective actions, their scheduled completion date and basis for the schedule, are described Table 1 (paragraph 2g below).

Additionally, to accommodate system fill and vents, and on line maintenance, 14 piping locations were identified where we have elected to install vents. Specifically, we currently credit SDC operation and refueling surveillance test procedures to dynamically fill SI piping prior to transitioning to Mode 3. Since we lose the ability to refill these locations at RCS pressures above HPSI discharge pressures, we have elected to install vents at those locations.

c. Potential Gas Intrusion Mechanisms:

The following are considered gas intrusion mechanisms:

(1) The formation of gas upstream of normally shut valves in SI discharge piping caused by leak-by of nitrogen saturated water from the safety injection tanks to the lower pressure SI discharge piping.

(2) The "stripping" of gas out of solution due to leakage of the RCS/SI boundary check valves.

(3) Gas coming out of solution due to dynamic pressure drops.

(4) Gas intrusion due to human error.

In-leakage through vent valves, valve packing, mechanical pump seals, threaded pipe connections, and gasketed flanges, is not considered a valid source of gas intrusion for us since all piping in the scope of the GL is under positive gauge pressure (excluding the dry CS piping at higher elevations in Containment).

The formation of steam upstream of the RCS/SI boundary check valves due to heat conduction from the RCS side of the check valve to the relatively low pressure, low temperature, SI side of the valve may be a potential source of gas intrusion. Inspections of these locations in Unit 1 showed no gas intrusion.

d. System Confirmation Walkdowns and Inspections:

Walkdowns and inspections for all system piping under the scope of the GL have been completed except for at the locations identified below. Note that it is not practical to walkdown or inspect the underground piping (e.g., the underground piping between the RWT room and the Auxiliary Building and the emergency containment sump piping from Containment to the Auxiliary Building). Therefore, we did not consider walkdowns and inspections of the underground piping to be within the scope of the GL. Also, results of an engineering evaluation precluded the need for high point vent verifications and field

inspections for a portion of the noted charging system flowpath. Specifically, those portions of the charging system used for providing a HPSI flow path for hot leg injection post-LOCA, verified by the evaluation not susceptible to the effects of adverse gas accumulation due to the inherent design ability to dynamically flush those portions of piping, were not included in the system confirmation walkdowns and inspections.

Remaining walkdowns and inspections along with their justification and schedule are presented below:

(1) Unit 2 piping inside Containment. Scheduled to be completed during the spring 2009 Unit 2 refueling outage. An outage is necessary to minimize radiation dose.

(2) Unit 2 West Penetration Rooms. Scheduled to be completed during the spring 2009 Unit 2 refueling outage. An outage is necessary to minimize radiation dose.

(3) Unit 1 27 ft West Penetration Room overhead-two horizontal piping runs (approximately 70 feet each), normal suction piping from the RWT. Scheduled to be completed during the next Unit 1 refueling outage, spring 2010. Access to the location requires transit through a locked high radiation area. Scaffold erection and insulation removal is required to perform the walkdowns and inspections.

(4) High point/slope determination on long, horizontal runs of the Unit 1 SI discharge piping in the Auxiliary Building. Scheduled to be completed no later than August 30, 2009. Although the slope of this discharge piping was not determined, all geometric high points and all high points upstream of the normally shut valves between the SI pump discharge and the RCS were ultrasonically tested. This data, combined with the Unit 2 inspection results, leads to the conclusion that the system remains operable.

The walkdown and inspection scope included the following:

- Verification that vents are located in the same location (elevation, axial, and circumferential), as designated by the appropriate isometric drawing.
- Identification of high points or slope (if any) on relatively long (greater than 20 feet) sections of horizontal pipe.
- Identification of unvented high points, located true high point and entered actions in the Corrective Action Program for installation of vents where necessary.
- Performance of ultrasonic testing of geometric high points.
- Performance of ultrasonic testing of high point locations in relatively long horizontal runs.
- Performance of ultrasonic testing of the first high point upstream of the RCS/SI boundary check valves.
- Performance of ultrasonic testing upstream of the normally shut valves between the ECCS pump discharge and the RCS**.**

Actions and results from the walkdowns and inspections are provided in Table 1 (see paragraph 2g). Each issue has been entered in our Corrective Action Program.

e. Fill and Vent Activities and Procedure Reviews:

Procedures associated with the subject systems were reviewed against the criteria of the GL 2008-01 response guidance. Corrective actions involving procedure changes, determined necessary to ensure compliance with the applicable requirements specified in

the GL as a result of the system walkdown evaluation performed, are identified in Table 1. Any additional gaps identified during the procedures review were entered in our Corrective Action Program. For activities not currently covered by procedures (e.g., restoration from infrequent maintenance activities involving small sections of piping and/or a limited scope of components), Condition Reports were initiated to drive development of general fill and vent processes.

f. Ongoing Industry Programs:

We understand that ongoing industry programs are planned in the following areas. These programs may impact the conclusions reached during the design evaluation relative to gas accumulation. These activities will be monitored to determine if additional changes to our design may be required or desired to provide additional margin.

- Gas Transport in Pump Suction Piping

  The Pressurized Water Reactor Owners Group 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

  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.

g. Items that have not been Completed and Schedule:

(1) The remaining walkdowns and inspections for Units 1 and 2, along with their justification and schedule are provided in paragraph 2d.

(2) A description of the corrective actions, including plant and procedure modifications that we determined necessary to assure compliance with the applicable regulations specified in the GL are identified in Table 1. The completed corrective actions, the schedule for completing the remaining corrective actions, and the basis for that schedule are also identified in Table 1.

(3) Three potential long-term actions have been identified by the industry relative to the GL, which were not completed in time for inclusion of any relevant conclusions in this GL response. We are tracking these long-term actions in our action item tracking process. The long-term actions identified by the industry are:

  (a) TSTF traveler development

  (b) Gas transport in pump suction piping and

  (c) Pump acceptance criteria.

Issues identified during the evaluation have been appropriately captured in our Corrective Action Program, as necessary. Those issues requiring corrective actions (as per the definition in the GL) are described in Table 1 below.

Table 1

Actions Generated From Evaluation

Issue	Corrective Action	Scheduled Completion Date	Basis for Scheduled Completion Date
11 CS Header need vent at location ID'd during drawing review.	Add Vent.	3/30/2010	No existing operability concerns. Refueling outage required.
Void found in 21 CS Header at location ID'd during drawing review.	Add Vent.	3/30/2009	No existing operability concerns. Refueling outage required.
Discovered gas in 11 HPSI second time. Vent not in high point.	Add Vent. Change procedure.	3/30/2010	No existing operability concerns. Refueling outage required.
Void found in SDC Rtn Header above 22 LPSI Pump.	Add Vent. Change procedure.	2/15/2009	No operability concerns during Modes 1-4. Corrective action scheduled for completion prior to entering mode of applicability requiring new vent. Date consistent with CAP.
Void found in SI discharge elbow (Unit 1 Containment). Flushed piping, eliminated void and re-inspected.	Change procedure.	1/09/2009	No existing operability concerns. Date consistent with CAP.
Void found in 22 HPSI suction. Vented piping verified void eliminated.	Change procedure.	1/09/2009	No existing operability concerns. Date consistent with CAP.
Void found in pipe from 21 SDC HX to 21 HPSI suction. Vented piping verified void eliminated. Also, vented 11, 12, 13 and 23 HPSI suction per extent of condition review.	Change procedure.	1/09/2009	No existing operability concerns. Date consistent with CAP.
Void in Unit 2 Hot Leg flush piping. Vented piping, verified void eliminated.	Change procedure.	1/09/2009	No existing operability concerns. Date consistent with CAP.
Void in H/Pt vent for SDC Purif Return to Unit 2 LPSI (located in SFP Clg pipe). Vented piping, verified void eliminated.	Change procedure.	Complete	Complete.
Void in high point vent for SDC Purif Return to Unit 1 LPSI (located in SFP Clg pipe). Vented piping, verified void eliminated.	Change procedure.	Complete	Complete.
Void found in U2 CVCS/SI cross-over piping.	Develop procedure. Dynamically fill per engineering change package.	3/30/2009	No existing operability concerns. Refueling outage required.

h. Conclusion:

Based upon the above, we conclude that we are in conformance with our commitments to the applicable criteria of 10 CFR 50, Appendix B, as described in our Quality Assurance Policy. Any identified deviations that have not yet been corrected are entered into our Corrective Action Program for tracking and final resolution.

3. Testing Evaluation

We do not currently have a periodic surveillance requirement to verify the subject systems are sufficiently full of water. As can be seen from the above evaluation, we do not have operability concerns resulting from gas intrusion into the systems addressed by GL 2008-01.

The TSTF traveler (discussed in Section 1) is expected to contain TS Surveillance(s) to address detection of gas accumulation in the subject systems. Until we have determined our response to an approved TSTF traveler (including changes to our TS as appropriate), we will develop and implement interim surveillance measures in owner-controlled documents.

4. Corrective Action Evaluation

Our Corrective Action Program is used to document gas intrusion/accumulation issues as potential nonconforming conditions. Existing procedures for the subject systems require a condition report to be initiated and reviewed for a nonconforming condition. If an accumulated gas volume is identified, the Shift Manager is notified. As part of our Corrective Action Program, condition reports related to plant equipment are evaluated for potential impact on operability and reportability. Therefore, our review concluded that issues involving gas intrusion/accumulation are properly prioritized and evaluated under the Corrective Action Program.

B. DESCRIPTION OF NECESSARY CORRECTIVE ACTIONS

Corrective actions determined necessary to ensure compliance with the applicable quality assurance criteria of 10 CFR Part 50, Appendix B, our licensing bases, or our operating license with respect to the subject systems, are identified in Table 1 (see Section A, paragraph 2g).

C. CORRECTIVE ACTION SCHEDULE

The schedule for the corrective actions determined necessary to ensure compliance with the applicable quality assurance criteria of 10 CFR Part 50, Appendix B, our licensing bases, or our operating license with respect to the subject systems, is identified in Table 1 (see Section A, paragraph 2g).

D. CONCLUSION

We have evaluated the accessible portions of the subject systems that perform the functions described in GL 2008-01 and have concluded that these systems are Operable, as defined in our Technical Specifications. Further, the subject systems are in conformance with our commitments to the applicable draft GDC, as stated in our UFSAR.

As committed in Reference (1), we will complete our evaluation of the inaccessible portions of the subject systems by startup from the next scheduled refueling outages at Units 1 and 2 and will provide a supplement to this response within 90 days after each Unit's respective scheduled refueling outage.

REFERENCE

(1) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated October 10, 2008, Three-Month Supplemental Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"