**Calvert Cliffs Nuclear Power Plant**

1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Constellation Energy
Nuclear Group

September 28, 2009

U. S. Nuclear Regulatory Commission
Washington, DC 20555

**ATTENTION:** Document Control Desk

**SUBJECT:** Calvert Cliffs Nuclear Power Plant
Unit Nos. 1 & 2; Docket Nos. 50-317 & 50-318
Response to Request For Additional Information Re: Response to Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"- Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 – (TAC Nos. MD7807 and MD7808)

**REFERENCES:**

(a) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated October 14, 2008, Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"

(b) Letter from Mr. T. E. Trepanier (CCNPP) to Document Control Desk (NRC), dated June 12, 2009, Nine-Month Supplemental (Post-Outage) Response to NRC Generic Letter 2008-01

(c) NRC Generic Letter 2008-01, dated January 11, 2008, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems

(d) Letter from Mr. D. V. Pickett (NRC) to Mr. J. A. Spina (CCNPP), dated August 12, 2009, Request for Additional Information Re: Response to Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems"- Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. MD7807 and MD7808)

By letters dated October 14, 2008, and June 12, 2009 [References (a) and (b), respectively] we provided supplemental responses to Generic Letter 2008-01 [Reference (c)]. Based on the information provided, as stated in Reference (d), the Nuclear Regulatory Commission staff concluded that additional information is required in order to determine that Calvert Cliffs Nuclear Power Plant, Inc. has acceptably demonstrated that the Generic Letter subject systems are in compliance with the current licensing and design bases and applicable regulatory requirements, and that suitable design, operational, and testing control measures are in place for maintaining this compliance as stated in the Generic Letter [Reference (c)]. Our response to Reference (d) is provided in the attachment to this correspondence.

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NRR

Should you have questions regarding this matter, please contact Mr. Jay S. Gaines at (410) 495-5219.

Very truly yours,

Thomas E. Trepanier
Plant General Manager

**STATE OF MARYLAND** :
: **TO WIT:**
**COUNTY OF CALVERT** :

I, Thomas E. Trepanier, being duly sworn, state that I am Plant General Manager - Calvert Cliffs Nuclear Power Plant, Inc. (CCNPP), and that I am duly authorized to execute and file this response on behalf of CCNPP. To the best of my knowledge and belief, the statements contained in this document are true and correct. To the extent that these statements are not based on my personal knowledge, they are based upon information provided by other CCNPP employees and/or consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

Subscribed and sworn before me, a Notary Public in and for the State of Maryland and County of Calvert, this 28 day of September, 2009.

**WITNESS** my Hand and Notarial Seal:

Notary Public
Wendy L. Hunter
NOTARY PUBLIC
Calvert County, Maryland
My Commission Expires 01/01/10

My Commission Expires:

Date

TET/ALS/bjd

Attachment: (1) Response to Request for Additional Information Generic Letter 2008-01

cc: D. V. Pickett, NRC
S. J. Collins, NRC
Resident Inspector, NRC
S. Gray, DNR

# ATTACHMENT (1)

# RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

# GENERIC LETTER 2008-01

## ATTACHMENT (1)

## RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION GENERIC LETTER 2008-01

This attachment contains the Calvert Cliffs Nuclear Power Plant response to the Nuclear Regulatory Commissions Request for Additional Information (RAI) (Reference 6).

We consulted Reference 1, which is generally consistent with the Nuclear Energy Institute guidance provided to the industry (Reference 2), to develop our responses to the RAIs.

**RAI No. 1:**

*Generic Letter (GL) 2008-01 (Reference 3) discussed the loss of high pressure safety injection (HPSI) pumps at Oconee in 1997 as an example of failure of a subject system. This was caused by a failure of level transmitters associated with the letdown storage tank that is commonly referred to as the volume control tank (VCT). The VCT was not identified in the Reference 4 reply to the GL [Generic Letter]. Either identify the VCT as a part of the subject systems or provide a justification for its exclusion.*

***Response to RAI No. 1:***

At Calvert Cliffs, none of the pumps for the subject systems in the scope of the GL take suction from the VCT. The subject systems do not interact with the VCT in any way. Therefore, the VCT is excluded from the subject systems.

**RAI No. 2:**

*Provide a schedule for applying the technical specification task force process to any technical specification modifications.*

***Response to RAI No. 2:***

We will monitor the industry resolution of the gas accumulation Technical Specification issues and, within no greater than six months following the Nuclear Regulatory Commission approval of the Technical Specification Task Force or Consolidated Line Item Improvement Process Notice of Availability, we will evaluate submitting a Technical Specification amendment request, as appropriate, that is consistent with resolution of the generic issue.

**RAI No. 3:**

*An evaluation of vortex formation was stated to have concluded that effects of minor air entrainment into the high pressure safety injection pumps, due to vortexing from the refueling water tank and emergency containment sump during design bases accidents were found acceptable. Since expected flow rates under accident conditions may significantly exceed the design basis accident flow rates, discuss how the stated conclusions are applicable to actual expected accident conditions.*

***Response to RAI No. 3:***

The inputs and assumptions used to compute the flow rates used in the vortexing analysis were selected to conservatively maximize these flow rates. This includes pump over-performance, diesel over-frequency, and minimum Reactor Coolant System/containment pressures. The vortexing analysis did not use the minimum required pump flow rates used in our Updated Final Safety Analysis Report, Chapter 14 Safety Analysis.

It is noted that work is being done by the industry to more fully understand and address air entrainment from the refueling water tank. Calvert Cliffs will continue to follow this issue.

**RAI No. 4:**

*The responses (References 4 and 5) did not consider the effect a water hammer would have on operability. Justify that water hammers were appropriately excluded from consideration or provide an evaluation of the effect of pressure pulses and water hammers as per Reference 1.*

***Response to RAI No. 4:***

It is not practical to perform an engineering evaluation bounding all possible consequences of a maximum, acceptable, predetermined void size for any given location in the subject systems. Therefore, any void found is entered in our Corrective Action Program and evaluated accordingly. For the voids found and described in References 4 and 5, a formal water hammer evaluation was not performed at the time they were discovered. However, engineering judgment determined that there were not any effects due to the presence of the voids that were sufficient to impact system operability. An evaluation using more refined analytical methods has now been performed.

A void size of 5.7 $in^3$ was calculated for the void in the containment spray discharge piping, and a void size of 1 $in^3$ was calculated for the void in the safety injection discharge piping. Although the possibility of significant water hammer loads was unlikely based on the small size of the voids, which were in 8-inch and 6-inch diameter piping, respectively, a scoping evaluation was performed for the 5.7 $in^3$ void.

The calculated peak transient water hammer load was added to the other design loads analyzed in the existing pipe support calculations. The scoping structural analysis concluded that the water hammer load was acceptable for both pipe bending and the loads on the pipe supports.

Given the results of the water hammer scoping evaluation for the 5.7 $in^3$ void and the major conservatisms in the approach, no analogous evaluation is needed to conclude water hammer is not a concern for the much smaller void (1 $in^3$).

The evaluation confirmed the initial engineering judgment that there were not any effects due to the small gas voids discovered that would have impacted system operability.

**RAI No. 5:**

*Clarify the frequency at which the subject systems are inspected for voids. If inspections are less frequent than once every 31 days, provide a justification.*

***Response to RAI No. 5:***

The subject systems are inspected for voids every two years.

Calvert Cliffs has not identified any credible source of gas accumulation other than potential failure to properly fill and vent, and/or dynamically flush systems and portions of systems following maintenance. Not one instance of gas intrusion due to stripping, desorption, expansion, heat conduction, or any other postulated mechanism for gas generation across leaking boundary valves between fluids at different temperatures and/or pressures has been detected. However, we have developed Repetitive Maintenance Tasks (Reptasks) as a method to periodically check for the presence of gas released from fluids through the mechanisms postulated above. The Reptasks were developed to periodically ultrasonic test those strategic high points identified in our evaluation (i.e., those high points where the presence of gas could potentially create a hydraulic transient or potentially threaten pump operability). The Reptasks will be

performed pre-outage or pre-startup as necessary to ensure the subject systems are not impacted by gas intrusion effects.

The initial frequency for the performance of each Reptask is two years. The results of our initial inspections, our procedural enhancements and plant modifications (in response to the GL) combined with our internal operating experience and original plant design, support this frequency.

**RAI No. 6:**

*In Reference 4 it is stated that the "Corrective Action Program is used to document gas intrusion/accumulation issues as potential nonconforming conditions [and]... evaluated for potential impact on operability and reportability." Clarify whether follow-up actions will be accomplished through the corrective action program whenever a void is identified or provide justification of excluding voids. Clarify the definition of "potential impact" (Reference 4), clarify the definition of the phrase "no appreciable gas" (Reference 5), including any criteria used to determine acceptability.*

***Response to RAI No. 6:***

The Corrective Action Program will continue to be used throughout the inspection process to document gas intrusion/accumulation issues, evaluate their potential impact on operability and prescribe corrective follow-up actions. No voids are considered exempt.

In Reference 4, we stated: "As part of our Corrective Action Program, condition reports related to plant equipment are evaluated for potential impact on operability and reportability." In this sentence, the phrase "potential impact" was used to describe the "actual impact" on operability in the current Mode, and the "potential impact" on operability in all other applicable Modes. Specifically, during the initial inspections, some gas voids were detected that could not impact the operability of the subject systems in the Mode in which they were detected. However, these voids could "potentially impact" operability in another Mode of operation. Therefore, for those cases operability evaluations and/or corrective actions were accomplished prior to entering the Mode of applicability.

In Reference 5, we stated "...since no appreciable gas was found in the high points of the loops at the 47 ft elevation..." This sentence is referring to Unit 2 inspections of safety injection piping at the 47 ft elevation in Containment during the 2009 Refueling Outage. In the specific context of this sentence, it would have been technically correct to say "no gas was found." However, in 2008, during the initial inspections at the same locations in Unit 1, a 1.2 cubic inch bubble was found at the top of a 12 inch elbow of safety injection piping. The bubble was detected in Mode 3 prior to initiating shutdown cooling. The location was checked in Mode 3 coming out of the outage and the bubble was gone. "No appreciable gas" was used instead of "no gas" to allow for this exception.

**RAI No. 7:**

*Venting of the subject systems is accomplished by following processes described in station procedures. Describe the void surveillance procedures used to ensure that the gas was successfully vented and gas was not transported to a previously inspected high point.*

***Response to RAI No. 7:***

When restoring a system, or portion thereof, which contains multiple high point vents, station personnel are directed to consult one-line elevation drawings which have been developed in response to the GL. Further, they are directed to use industry best practices by venting from the lowest elevation to the highest

and consider repeating the process depending on the complexity of the volume being restored. As stated previously, Reptasks were developed to ensure the Emergency Core Cooling System (ECCS) is filled and vented and then verified full by ultrasonic testing strategic high points. Also, when relying on a dynamic flush to fill a portion of a system, the downstream high points are ultrasonic tested and any voids are eliminated or evaluated prior to considering the system operable.

**RAI No. 8:**

*Address post-surveillance activities by providing a brief description of such activities as, the response actions to be taken if surveillance criteria are not met, and the trending of gas volume for tracking purposes.*

***Response to RAI No. 8:***

Calvert Cliffs has no Technical Specification surveillance requirements related to water level in ECCS piping. As stated previously, we have developed Reptasks to assure the ECCS remains full of water. Our addition of high point vents minimizes the need to trend void size; the vents allow the elimination of any gas found. However, if a void is detected that can not be eliminated; it will be evaluated in accordance with our station Corrective Action Program, including appropriate trending.

**RAI No. 9:**

*Describe how procedures and the work control process are used to ensure that the subject systems are not rendered inoperable as a result of voids introduced during maintenance. The licensee states that "For activities not currently covered by procedures... Condition Reports were initiated to drive development of general fill and vent processes" (Reference 4). If the current maintenance work process and procedures do not ensure that any voids introduced during maintenance are either determined to be acceptable or adequately vented prior to returning the component to service; provide a schedule for the development and implementation of the procedures.*

***Response to RAI No. 9:***

All procedures associated with the subject systems were reviewed against the criteria of the GL 2008-01 Response Guidance (Reference 1). Condition Reports were initiated to evaluate gaps identified between our existing procedures and Reference 1. The gaps did not represent any immediate operability concerns or any reportability concerns. The condition reports established corrective actions to close the gaps identified. The corrective actions included revising existing procedures or establishing new procedures. All procedure changes have been completed.

**RAI No. 10:**

*Describe the monitoring of pump operation in all modes and specialized monitoring of appropriate plant parameters during shutdown operation, including reduced inventory and mid-loop operation.*

***Response to RAI No. 10:***

Pump operation is monitored by low pressure safety injection pump suction pressure alarms, as well as high pressure safety injection and low pressure safety injection discharge pressure alarms to warn the operator of poor pump performance. Additionally, operators monitor amps and discharge pressure of the ECCS pumps when starting them and periodically during operation. During emergency conditions, Emergency Operating Procedure steps require operators to check for proper flow from the ECCS pumps when they are operating.

**RAI No. 11:**

*Training was not identified in the GL but is considered to be a necessary part of applying procedures and other activities when addressing the issues identified in the GL. Briefly discuss training.*

***Response to RAI No. 11:***

Training was provided in response to GL 2008-01. Specifically, both licensed operator initial training and requalification modules were created to provide the training. The lesson plan effectively captured the GL material. The training was provided to the initial operator class on June 24, 2009. The licensed operator requalification training was provided during the licensed operator requalification sessions held July 17, 2009 through August 21 2009.

**REFERENCES**

(1) Ruland, William H., "Preliminary Assessment of Responses to Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,' and Future NRC Staff Review Plans," NRC letter to James H. Riley, Nuclear Energy Institute, ML091390637, May 28, 2009

(2) Riley, James H., "Generic Letter (GL) 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Contain Spray Systems' Evaluation and 3 Month Response Template," Letter to Administrative Points of Contact from Director, Engineering , Nuclear Generation Division, Nuclear Energy Institute, Enclosure 2, "Generic Letter 2008-01 Response Guidance," March 20, 2008

(3) NRC Generic Letter 2008-01, dated January 11, 2008, Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems, ML072910759

(4) Letter from Mr. J. A. Spina (CCNPP) to Document Control Desk (NRC), dated October 14, 2008, Nine-Month Response to NRC Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," ML082900149

(5) Letter from Mr. T. E. Trepanier (CCNPP) to Document Control Desk (NRC), dated June 12, 2009, Nine-Month Supplemental (Post-Outage) Response to NRC Generic Letter 2008-01, ML091670262

(6) Letter from Mr. D. V. Pickett (NRC) to Mr. J. A. Spina (CCNPP), dated August 12, 2009, Request for Additional Information Re: Response to Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems" – Calvert Cliffs Nuclear Power Plant, Unit Nos. 1 and 2 (TAC Nos. MD7807 and MD7808)