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July 28, 2010

SOUTHERN COMPANY

Docket Nos.: 50-424
50-425

NL-10-1228

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

Vogtle Electric Generating Plant
Response to NRC Generic Letter 2008-01
Response to Request for Additional Information

Ladies and Gentlemen:

On January 21, 2009 (NL-08-1921) and January 20, 2010 (NL-10-0062) SNC submitted the Vogtle Electric Generating Plant(VEGP) Unit 2 and Unit 1, respectively, nine-month supplemental post-outage responses to Nuclear Regulatory Commission (NRC) Generic Letter 2008-01. By letter dated June 16, 2010, the NRC staff requested additional information regarding the previous responses referenced above.

The enclosure to this letter contains the SNC response to the referenced NRC request for additional information.

This letter contains one NRC commitment.

Ms. P. M. Marino states she is Vice President Engineering of Southern Nuclear Operating Company, is authorized to execute this oath on behalf of Southern Nuclear Operating Company and to the best of her knowledge and belief, the facts set forth in this letter are true.
If there are any questions, please contact N. J. Stringfellow at 205-992-7037.

Respectfully submitted,

Paula M. Marino

Paula M. Marino
Vice President Engineering

PMM/PAH/llc

Sworn to and subscribed before me this 28th *day of* July, *2010.*

Charlotte A. Graham
Notary Public

My commission expires: 6/9/12

A134
NRR

Enclosures:

1. RAI Response to the NRC
2. Regulatory Commitment

cc: <u>Southern Nuclear Operating Company</u>
Mr. J. T. Gasser, Executive Vice President
Mr. T. E. Tynan, Vice President – Vogtle
Mr. M. J. Ajluni, Nuclear Licensing Director
RType: CVC7000

<u>U. S. Nuclear Regulatory Commission</u>
Mr. L. A. Reyes, Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Vogtle
Mr. M. Cain, Senior Resident Inspector – Vogtle
Mr. P.G. Boyle, NRR Project Manager

Vogtle Electric Generating Plant
Response to NRC Generic Letter 2008-01
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Enclosure 1

REQUEST FOR ADDITIONAL INFORMATION (RAI)

ENCLOSURE 1
REQUEST FOR ADDITIONAL INFORMATION (RAI)

The Nuclear Regulatory Commission (NRC) staff requests additional information, as identified below, regarding the response of the Southern Nuclear Operating Company, Inc. (SNC) to Generic Letter 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," (GL 2008-01), for the Vogtle Electric Generating Plant, Units 1 and 2 (VEGP). Guidance on the NRC staff's expectations is provided by Reference 1 which is generally consistent with Nuclear Energy Institute (NEI) guidance provided to industry in Reference 2 as clarified in later NEI communications. The NRC staff recommends that the licensee consult Reference 1 when responding to the following RAIs:

1. **Provide a regulatory commitment and a schedule for applying the Technical Specification Task Force (TSTF) process to any Technical Specification (TS) changes resulting from GL 2008-01.**

   Response to Question 1:

   Southern Nuclear Operating Company (SNC) has provided a regulatory commitment in Enclosure 2. Additionally, SNC expects to submit a technical specification change for VEGP within a year after the issuance of an NRC approved TSTF.

2. **References 4 through 7 did not address the potential for gas to come out of solution as it passes through the containment emergency sump screens where it may collect and then pass into pipes leading to the pumps. Please provide a brief description of the analysis that supports resolution of this issue.**

   Response to Question 2:

   SNC is aware of this issue and plans to address this issue within the GL 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" and GSI-191 response/actions.

3. **Please provide a summary of the current version of Procedure 50085-C, "Gas Accumulation Monitoring and Trending." Consistent with Section 3.5.2 of Reference 1, please address the following in the summary.**

   a) **Where venting is accomplished, briefly describe how volumes are determined and provide estimated void volume determination uncertainty.**
   b) **Describe any instructions for sampling and chemical analyses of accumulated gas.**
   c) **Describe the incorporation of gas void size acceptance criteria and the requirement to initiate a Condition Report when the applicable criteria is exceeded.**
   d) **Briefly describe method(s) used to identify and quantify gas voids when there is no vent.**
   e) **Describe method(s) used to trend the size of the gas void**

Response to Question 3:

Summary

Every month system piping is checked for gas voids by venting or through ultrasonic testing (UT). Monitoring locations on the RHR, SI, and CVCS systems are located both inside and inside of containment. The following is a list of the number of points that are checked through UT every month:

Unit 1

Inside Containment 18 points
Outside Containment 3 points

Unit 2

Inside Containment 15 points
Outside Containment 0 Points

Additionally, every month points are vented by Operations to check for gas both inside and outside containment

Unit 1

Inside Containment 5 points
Outside Containment 35 points

Unit 2

Inside Containment 13 points
Outside Containment 38 points

There are additional monitoring locations, including containment spray, that have no gas generation mechanism during normal operation. These points are checked if a system is drained or following an outage where a significant number of systems are drained or realigned from their normal configuration. All points are checked within a refueling cycle periodicity as a minimum.

The monitoring locations are checked for gas voids and if found, the amount of gas in the system is quantified and documented with a CR. The void size is checked against all appropriate acceptance criteria; i.e., suction or discharge, and total.

Gas void volumes are recorded for all monitored locations and summarized for all the ECCS systems. The information is distributed to all ECCS system engineers who report and trend the data in their respective system health reports.

a. **Where venting is accomplished, briefly describe how volumes are determined and provide estimated void volume determination uncertainty.**

When venting is necessary to remove a gas void from a system, the Operations venting procedure has specific guidance on how this is to be done. The vent valve is opened ¼ of a turn and a stopwatch is used to count until there is a solid stream of water flowing through the valve.

This information, along with the pressure at the vent valve, the flow coefficient, and the temperature of the gas is used to calculate the void volume that was vented.

The method for determining this vented volume was developed with the Crane Technical Paper No. 410, *Flow of Fluids Through Valves, Fittings, and Pipe*

Uncertainty could be introduced because of using a stopwatch and from calculating the flow coefficient of the vent valve. This error is recognized and every effort is used to minimize any uncertainty introduced.

The venting process promptly restores the system to a filled condition and provides reasonable assurance that functionality is met. Further evaluation and more frequent monitoring and trending are performed to investigate the cause and initiate corrective action. After the volume of air is calculated, a comparison will be made to the acceptance criteria. If the void is determined to be close to the acceptance criteria, uncertainties will be considered in the evaluation process.

NEI Document 09-10 Rev 0, "Guidelines for Effective Prevention and Management of System Gas Accumulations," dated October 2009 lists this vent timing method as one that can be used for determining the size of a gas void under section 12.3 Gas Void Quantification (pg 20).

b. **Describe any instructions for sampling and chemical analysis of accumulated gas.**

Both the Operations venting procedure and the Engineering Monitoring procedure contain requests for Chemistry to sample the vented gas and determine its makeup to further determine the source of the gas. Chemistry personnel would use an established grab sampling procedure to perform the sampling and analysis.

c. **Describe the incorporation of gas void size acceptance criteria and the requirement to initiate a Condition Report when the applicable acceptance criteria are exceeded.**

The gas monitoring procedures for Engineering and Operations contain a step to generate a CR if any gas voids are found during venting or during ultrasonic testing. Gas void size is further evaluated against the established acceptance criteria to determine its effect ECCS/CS operability as part of the CR process.

d. **Briefly describe method(s) used to identify and quantify gas voids where there is no vent.**

If there is no vent available, ultrasonic testing is used to check for gas as well as map out any locations that contain gas. Then geometric calculations are used to determine the quantity of gas in a particular pipe.

e. **Describe method(s) used to trend the size of the gas void.**

Gas void size is trended both in the System Health Reports of the ECCS systems as well as in the common engineering procedure for each unit and is summarized for all ECCS/CS systems.

4. Reference 7 is silent regarding the NRC staff Reference 3 criterion for pump response to gas of 1 percent (%). Please provide reference to plant specific document for updating VEGP's criteria, if needed, with respect to the NRC staff's Reference 3 criteria. If unavailable, please provide plan and schedules for completing the analysis.

Response to Question 4:

From NEI Letter Project Number: 689, "Industry Guidance - Evaluation of Unexpected Voids or Gas Identified in Plant ECCS and Other Systems," dated June 2009 it can be determined that for the Vogtle ECCS and CSS pumps, the void fractions that can be applied are contingent on the operating flow rate through the pump being in the range of 70% to 120% of the Best Efficiency Point (BEP).

From a review of the pump curves for the respective pumps, the table below shows the percentage of the BEP that the pumps are operating, when assuming the flow rates in this calculation. The table also shows the steady state and transient limits that apply to each pump at the percentage of the BEP that is noted.

Acceptance Pump Limits at Given BEP Percentages

Pump Type	Q/Q_{BEP} (%)	Steady State Limit	Transient Limit
RHR	100%	2%	5% for 20 seconds
CS	118%	2%	5% for 20 seconds
SI	147%	1%	5% for 5 seconds
CC	159%	1%	5% for 5 seconds

5. **References 5 through 7 appear to exclude all insulated piping from walkdowns. This is inconsistent with Section 3.4.6 of Reference 1. Please justify omission or provide summary of results of walkdowns, including how the piping and components were dimensionally assessed.**

   Response to Question 5:

As part of the evaluation performed by Southern Nuclear in response to Generic Letter, 2008-01 the following strategy was employed:

Engineering drawings were reviewed to identify potential void accumulation locations. The focus of the initial review was to identify additional high points (all areas vulnerable to gas accumulation), including:

- High points in pipe runs, including elevation variation in nominally horizontal pipes (e.g. improperly sloped piping)
- High points created by closed valves in vertical piping runs
- DHR system heat exchanger, U-tubes, or other heat exchangers
- Horizontal pipe diameter transitions that introduce traps at the top of the larger piping or piping upstream of components (including orifice plates, reducers, and backing rings)
- Tees where gas contained in flowing water can pass into a stagnant pipe where it then accumulate
- Valve bonnets
- Pump casings

System operation was reviewed to identify any potential gas intrusion mechanisms that might lead to the development of voids in piping segments or system components. These areas included:

- Locations where air can be introduced during routine maintenance
- Locations where applicable systems are initially filled with an air saturated water source and the air can be stripped out due to various mechanisms such as agitation, pressure reduction, or temperature increase
- Locations where hydrogen introduced into the VCT will come out of solution in the charging pump mini-flow lines and RCP seal leak-off due to large pressure drops across mini-flow orifices and RCP seals and could be transported to the charging pump suction lines
- Locations where, nitrogen comes out of solution in the SI accumulator due to leakage from the accumulators into the ECCS through normally closed check valves in the ECCS lines and normally closed isolation valves in the test system
- Locations where steam or non-condensable gases can be introduced due to leakage from the RCS into the ECCS.
- Locations where non-condensable gases can be introduced due to leakage from the nitrogen and hydrogen supply lines to the VCT and SI accumulators
- Locations where hydrogen can come out solution in charging pump suction lines due to VCT pressure changes
- Locations where gas may collect in the RHR HX U-tubes and can be flushed into the pump suction header during periodic pump surveillance testing

In addition, system operation was also reviewed to ascertain whether sufficient sweeping flow was available to flush piping segments and preclude collection of voids. Also, whether the piping section was on the pump suction or discharge was factored into the evaluation. Areas that contained a high potential for gas intrusion and a high potential for gas entrapment were considered to be critical.

Based on the above evaluation, prioritized system walk-down scopes were developed during the summer of 2008. The purpose of the walk-downs was to confirm the physical arrangement of in-scope piping as detailed in the engineering drawings or identify any previously unrecognized configuration issues. Particular attention was given to areas that had been classified as critical as described above. The walk-down activity was divided into three phases and included:

Phase 1: Accessible piping

- Performed visual walk-downs to confirm the location of vent valves
- Performed LASER Scanning of piping to determine slope

Phase 2: Inaccessible Piping (requiring scaffolding, insulation removal, etc.) outside of containment

- Performed visual walk-downs to confirm the location of vent valves
- Performed LASER Scanning of non-insulated piping to determine slope
- Performed LASER Scanning of insulated piping (with insulation removed) that contained locations that were judged to have high potential for void accumulation.

Phase 3: Piping in Containment or otherwise not accessible during operation

- Performed visual walk-downs to confirm the location of vent valves
- Performed LASER Scanning of non-insulated piping to determine slope
- Performed LASER Scanning of insulated piping (with insulation removed) that contained locations that were judged to have high potential for void accumulation.

In summary, as a result of the strategy described above, selected areas of insulation were removed to allow laser scanning at VEGP. These sections of piping were judged to possess an active gas accumulation mechanism and a physical arrangement that could prevent movement of a void to a vent location. Southern Nuclear is confident that using these evaluation techniques provides reasonable assurance the ECCS, DHR, and Containment Spray piping is sufficiently full for operation. Therefore, system monitoring, procedures, and training implemented as part of GL 2008-01 provide assurance that the subject systems remain operable.

6. **Training was not identified in the GL, but is considered by the NRC staff to be a necessary part of applying procedures and other activities when addressing the issues identified in the GL. This was identified in the Reference 2 NEI template as an item that should be addressed in the GL. This is not addressed in your response. Please provide a brief description of planned training and its schedule.**

Response to Question 6:

Training was conducted with Operations personnel about proper venting and about GL 2008-01. The training programs for Operations personnel have been completed. This training also occurs on a recurring schedule. The following information about Operations training is provided.

- Training for operations personnel for gas intrusion was included in training segment 5 in 2008 training.
- Operations training in gas fill and venting was included in training segment 5 in 2009 training. It included training on SEN 278, "Inadvertent Complete Draining of Pressurizer During Reactor Coolant System Inventory Reduction," and also on SOER 97-01, "Potential Loss of High Pressure Injection and Charging Capability From Gas Intrusion."
- In response to GL 2008-01, training for licensed operators including senior reactor operators (SROs), reactor operators (ROs), and system operators (SOs) was included in training segment 2 in 2010.
- Training modules for licensed operations personnel and a training module for non-licensed personnel such as system operators were revised to include ECCS gas intrusion.

INPO training material will be used to conduct training for engineering personnel during 2010. This training will also be provided on a recurring schedule.

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.

a. Warren C. Lyon, U.S. Nuclear Regulatory Commission, "Revision 2 to NRC Staff Criteria for Gas Movement in Suction Lines and Pump Response to Gas," dated March 26, 2009 (ADAMS Accession No. ML090900136).

b. Letter from SNC, "Three-Month Response to NRC Generic Letter 2008-01, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" dated May 30, 2008, (Agencywide Document Access and Management System (ADAMS) Accession No. ML0815402230).

c. Letter from SNC, "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 10, 2008, (ADAMS Accession No. ML082880119).

d. Letter from SNC, "Unit 2 Nine-Month Supplemental Response to NRC Generic Letter 200801, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" dated January 21,2009, (ADAMS Accession No. ML090220333).

e. Letter from SNC, "Unit 1 Nine-Month Supplemental Response to NRC Generic Letter 200801, 'Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems,'" dated January 20,2010, (ADAMS Accession No. ML100220234).

Vogtle Electric Generating Plant
Response to NRC Generic letter 2008-01
Response to Requests for Additional Information

Enclosure 2
Regulatory Commitment

ENCLOSURE 2
Regulatory Commitment

NRC Commitment	Type One-Time Action	Scheduled Completion Date
SNC will either submit a technical specification based on the TSTF or submit a plant specific technical specification change for VEGP within a year after the issuance of an NRC approved TSTF concerning gas intrusion.	X	After NRC Issuance