UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 17, 2008

Mr. Thomas Joyce
President and Chief Nuclear Officer
PSEG Nuclear
P.O. Box 236, N09
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING GENERIC LETTER 2004-02 (TAC NOS. MC4712 AND MC4713)

Dear Mr. Joyce:

By letter dated February 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML080800469), PSEG Nuclear LLC (the licensee) submitted a supplemental response to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors," for Salem Nuclear Generating Station (Salem), Unit Nos. 1 and 2.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal. The process involved detailed review by a team of approximately 10 subject matter experts, with a focus on the review areas described in the NRC's "Revised Content Guide for Generic Letter 2004-02 Supplemental Responses" (ADAMS Accession No. ML073110389). Based on this review, the staff has determined that additional information is needed in order to determine if GL 2004-02 has been satisfactorily addressed for Salem, Unit Nos. 1 and 2. The specific information needed is contained in the enclosed request for additional information (RAI).

The NRC requests that the licensee respond to this RAI by March 31, 2009. However, the NRC would like to receive only one response letter for all RAI questions with one exception stated below. If the licensee concludes that more time is required to respond, the licensee should request additional time, including a basis for why the extension is needed.

If the licensee concludes, based on its review of the RAI, that additional corrective actions are needed for GL 2004-02, the licensee should request additional time to complete such corrective actions as needed. Criteria for such extension requests are contained in SECY-06-0078 (ADAMS Accession No. ML053620174) and examples of previous requests and approvals can be found on the NRC's sump performance website, located at: http://www.nrc.gov/reactors/operating/ops-experience/pwr-sump-performance.html.

Any extension request should also include results of contingency planning that will result in near-term identification and implementation of any and all modifications needed to fully address GL 2004-02. The NRC strongly suggests that the licensee discuss such plans with the staff before formally transmitting an extension request.

The exception to the above response timeline is RAI question 21 in the enclosure. The NRC staff considers in-vessel downstream effects to not be fully addressed for Salem Unit Nos. 1 and 2, as well as at other pressurized water reactors (PWRs). The licensee's submittal refers to

Revision 0 of the PWR Owners Group (PWROG) topical report WCAP-16793-NP, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous, and Chemical Debris in the Recirculating Fluid." At this time, the NRC staff has not issued a final safety evaluation (SE) for this topical report since the PWROG intends to submit Revision 1 to address several issues identified by the Advisory Committee on Reactor Safeguards and the NRC staff.

The licensee may demonstrate that in-vessel downstream effects issues are resolved for Salem Unit Nos. 1 and 2, by showing that the plant conditions are bounded by the revised version of WCAP-16793 and the corresponding final NRC staff SE, and by addressing the conditions and limitations in the final SE. The licensee may also resolve RAI question 21 by demonstrating, without reference to WCAP-16793 or the NRC staff SE, that in-vessel downstream effects have been addressed at Salem, Unit Nos. 1 and 2. The specific issues raised in RAI question 21 should be addressed regardless of the approach the licensee chooses to take.

The licensee should report how it has addressed the in-vessel downstream effects issue and the associated RAI referenced above within 90 days of issuance of the final NRC staff SE on WCAP-16793. The NRC staff is currently developing a Regulatory Issue Summary to inform licensees of the staff's expectations and plans regarding resolution of this remaining aspect of Generic Safety Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance."

If you have any questions, please contact me at 301-415-1420.

Sincerely,

Richard B. Ennis, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosure: RAI

cc w/encl: Distribution via ListServ

REQUEST FOR ADDITIONAL INFORMATION

REGARDING GENERIC LETTER 2004-02

SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-272 AND 50-311

By letter dated February 29, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML080800469), PSEG Nuclear LLC (PSEG or the licensee) submitted a supplemental response to Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors," for Salem Nuclear Generating Station (Salem), Unit Nos. 1 and 2.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal. The process involved detailed review by a team of approximately 10 subject matter experts, with a focus on the review areas described in the NRC's "Revised Content Guide for Generic Letter 2004-02 Supplemental Responses" (ADAMS Accession No. ML073110389). Based on this review, the staff has determined that additional information is needed in order to determine if GL 2004-02 has been satisfactorily addressed for Salem, Unit Nos. 1 and 2. The specific information requested is addressed below.

1. Please describe what effect that the test jet size, used for acquiring test report WCAP-16710-P data, would have on applying the conclusions of that report to insulation systems at Salem, where potentially much larger jets could be experienced from reactor coolant system loop piping breaks.

2. Please summarize the test report WCAP-16727-NP methodology and describe how its conclusions were determined to be applicable to the lead blankets installed in the Salem containments, especially with respect to materials, construction, blanket quantity, proximity to the analyzed breaks, and mounting details.

3. Please provide a response to Open Item 3.5-1 in the NRC's GL 2004-02 audit report for Salem which stated:

> The licensee needs to demonstrate the capability of the unmodified mesh gate located near the ECCS [emergency core cooling system] strainers to withstand the potential post-LOCA [loss of coolant accident] structural loadings (e.g., jet impingement, subcompartment depressurization, and containment pool flows when obstructed with debris and provide a summary of results to the NRC staff.

Because the final head loss and vortexing evaluation has not yet been transmitted to the NRC, the following 14 topics (questions 4 through 17) should be addressed in a future supplemental response along with all standard responses in accordance with the NRC staff's revised content guide.

4. Please provide verification that the fibrous size distribution used during testing was prototypical or conservative compared to the size distribution predicted by the transport evaluation.

5. Please provide details of the debris addition procedures used. Please include a description of fibrous concentration during debris addition, the debris addition location, and the method of adding fibrous debris to the test tank. Please provide verification that the debris introduction processes did not result in non-prototypical settling, agglomeration, or deposition of debris prior to addition or as the material was added.

6. Provide the amounts of various debris types added during each test and describe the debris characteristics.

7. Please provide scaling values used for testing.

8. If the strainer head loss test(s) allowed near-field settling, please provide a comparison of the flows predicted around the strainer in the plant and the flows present in the test flume during the testing. Please show that the test velocities and turbulence levels were prototypical or conservative compared to the plant.

9. If the strainer head loss test(s) allowed near-field settling, please provide the amount of debris that settled in the test tank.

10. If agitation was utilized to prevent debris settling, please verify that the debris bed was not non-conservatively disturbed by the agitation and that non-prototypical transport did not result.

11. Please provide an overview of the test procedures used during testing (thin-bed and full-load tests).

12. Please provide any extrapolation performed on the test data to account for flow rates or temperatures different from those present during testing, but actually expected during the ECCS mission time. If temperature scaling is used, please discuss considerations made to identify and account for bore holes or channeling that may have occurred during testing. Alternatively, please discuss how it was verified that these phenomena did not occur.

13. Please provide the methodology used for calculation of clean strainer head loss (CSHL) and provide the CSHL value.

14. Please provide the void fraction downstream of the strainer.

15. Please verify that the limiting net positive suction head (NPSH) margin scenario has been considered for both single train and dual train ECCS operation.

16. Please evaluate the potential for flashing within the debris bed or strainer based on the head loss values obtained during final head loss testing considering one and two train operation.

17. Please provide the vortexing evaluation. Please consider the higher flow rates associated with the module closest to the pump suction and the non-uniformity in the flow pattern contributed by the upstream flow in containment.

18. Please provide description of any changes made to the NPSH calculation and minimum NPSH margins as a result of completion of strainer head loss testing.

19. Please address Open Item 5.1-1 in the NRC's GL 2004-02 audit report for Salem which stated:

    > Based on strainer head loss and chemical effects testing, confirm that the head-loss values used in the strainer module structural evaluation are conservative or revise the strainer module structural evaluation to reflect the maximum expected pressure drop across the strainer. Provide a summary of the results to NRC staff for review.

20. Please provide the information requested under item m, "Downstream effects - Components and Systems" in the "Revised Content Guide for Generic Letter 2004-02 Supplemental Responses" (ADAMS Accession No. ML073110389).

21. The NRC staff considers in-vessel downstream effects to not be fully addressed at Salem, as well as at other pressurized-water reactors. PSEG's submittal refers to Revision 0 of the Pressurized-Water Reactor Owners Group (PWROG) topical report WCAP-16793-NP, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous, and Chemical Debris in the Recirculating Fluid." At this time, the NRC staff has not issued a final safety evaluation (SE) for this topical report since the PWROG intends to submit Revision 1 to address several issues identified by the Advisory Committee on Reactor Safeguards and the NRC staff. The licensee may demonstrate that in-vessel downstream effects issues are resolved for Salem by showing that the Salem plant conditions are bounded by the revised version of WCAP-16793 and the corresponding final NRC staff SE, and by addressing the conditions and limitations in the final SE. The licensee may also resolve this item by demonstrating, without reference to WCAP-16793 or the staff SE, that in-vessel downstream effects have been addressed at Salem. In any event, the licensee should report how it has addressed the in-vessel downstream effects issue within 90 days of issuance of the final NRC staff SE on WCAP-16793. The NRC staff is developing a Regulatory Issue Summary to inform the industry of the staff's expectations and plans regarding resolution of this remaining aspect of Generic Safety Issue 191.

22. At the time of the supplemental response, the Salem chemical effects testing was not yet complete. Please provide the updated results from chemical effects testing that demonstrate the Salem plant-specific chemical effects have been evaluated in a conservative manner. Please provide this information using a similar format to that in your February 29, 2008, letter (ADAMS Accession No. ML080800469).

23. On page 40 of 124 of Attachment 1 of the PSEG supplemental response, it is noted that some of the debris is added downstream of the strainers:

    a. How much (in kilograms) and what percentage is added downstream?

    b. How is this consistent with the transport analysis for this plant?

c. Please describe how this material is introduced downstream of the pocket strainer in the multi-functional test loop.

24. Please confirm that the debris used for Salem Unit No. 2 chemical effects testing represented the bounding break location for Unit 2.

Revision 0 of the PWR Owners Group (PWROG) topical report WCAP-16793-NP, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous, and Chemical Debris in the Recirculating Fluid." At this time, the NRC staff has not issued a final safety evaluation (SE) for this topical report since the PWROG intends to submit Revision 1 to address several issues identified by the Advisory Committee on Reactor Safeguards and the NRC staff.

The licensee may demonstrate that in-vessel downstream effects issues are resolved for Salem Unit Nos. 1 and 2, by showing that the plant conditions are bounded by the revised version of WCAP-16793 and the corresponding final NRC staff SE, and by addressing the conditions and limitations in the final SE. The licensee may also resolve RAI question 21 by demonstrating, without reference to WCAP-16793 or the NRC staff SE, that in-vessel downstream effects have been addressed at Salem, Unit Nos. 1 and 2. The specific issues raised in RAI question 21 should be addressed regardless of the approach the licensee chooses to take.

The licensee should report how it has addressed the in-vessel downstream effects issue and the associated RAI referenced above within 90 days of issuance of the final NRC staff SE on WCAP-16793. The NRC staff is currently developing a Regulatory Issue Summary to inform licensees of the staff's expectations and plans regarding resolution of this remaining aspect of Generic Safety Issue 191, "Assessment of Debris Accumulation on PWR Sump Performance."

If you have any questions, please contact me at 301-415-1420.

Sincerely,
/ra/
Richard B. Ennis, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosure: RAI

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NAME	REnnis	ABaxter	MScott (LWhitney for)	AHiser	KManoly	HChernoff
DATE	12/10/08	12/2/08	12/2/08	12/5/08	12/8/08	12/1708

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