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Generic Letter 2004-02

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LR-N07-0304

United States. Nuclear Regulatory Commission
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Washington, DC 20555-0001

SALEM GENERATING STATION – UNIT 1 and UNIT 2
FACILITY OPERATING LICENSE NOS. DPR 70 and DPR-75
NRC DOCKET NOS. 50-272 and 50-311

Subject: **REQUEST FOR EXTENSION OF COMPLETION DATES FOR SALEM UNITS 1 AND 2 CORRECTIVE ACTIONS REQUIRED BY NRC GENERIC LETTER (GL) 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED-WATER REACTORS"**

Reference: (1) NRC Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004.

(2) Letter from PSEG to NRC: "90-Day Response to Generic Letter 2004-02 Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors, Salem Nuclear Generating Station, Units 1 and 2, Facility Operating License Nos. DPR-70 and DPR-75, Docket Nos. 50-272 and 50-311," dated March 4, 2005.

(3) Letter from PSEG to NRC: "Response to Generic Letter 2004-02 Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors, Salem Nuclear Generating Station, Units 1 and 2, Facility Operating License Nos. DPR-70 and DPR-75, Docket Nos. 50-272 and 50-311," dated September 1, 2005.

(4) Letter from NRC to Holders of Licenses for Pressurized-Water Reactors: "Alternative Approach for Responding to The Nuclear Regulatory Commission Request for Additional Information Letter Re: Generic letter 2004-02," dated March 28, 2006.

(5) Letter from NRC to Holders of Licenses for Pressurized-Water Reactors: "Alternative Approach for Responding to The Nuclear Regulatory Commission

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Request for Additional Information Letter Regarding Generic letter 2004-02," dated January 4, 2007.

On September 13, 2004 the NRC issued Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors." GL 2004-02 requested that each plant perform an evaluation of the Emergency Core Cooling System and Containment Spray System recirculation functions in light of the information provided in the Generic Letter and, if appropriate, take additional actions to ensure system function (Reference 1).

The response to date to GL 2004-02 was provided in two (2) sections: (1) a 90-day response from the date of the safety evaluation (Reference 2), and (2) additional information provided by September 1, 2005 (Reference 3).

PSEG is fully committed to resolving the containment sump issues in a timely manner. Currently, PSEG is performing a series of tests in a Multi-Function Test Loop (MFTL) at the CCI vendor facility. The test utilizes the Salem representative sump pool chemistry and debris loading in a proto-typical configuration. PSEG considers the test in this MFTL to model the Salem post-accident scenario. The results of the tests will establish a more specific basis for sump strainer Net Positive Suction Head (NPSH) and structural margin, including the effects of post-accident sump chemistry.

PSEG expects the testing to be successfully completed during the first quarter of 2008. Therefore, in accordance with the guidance provided by NRC in its letters dated March 28, 2006 and January 4, 2007 (References 4 and 5) PSEG respectfully requests an extension to June 30, 2008 to complete the testing, issue the associated test report, and to incorporate the results into design basis calculations.

Attachment 1 to this letter contains a detailed description of the extension request and the basis and justification for the request. Should you have any questions regarding this submittal, please contact Mr. Enrique Villar at 856-339-5456.

Sincerely,

Robert C. Braun
Site Vice President
Salem Generating Station

Attachments (1)

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Bases for Request for Extension of Completion Dates for Salem Units 1 and 2 Corrective Actions Required by Generic Letter 2004-02

Background

Generic Letter (GL) 2004-02 was issued on September 13, 2004 and required that licensees provide a description of and implementation schedule for all corrective actions, including any plant modifications that were identified in responding to the GL. The GL further requested that licensees complete all required corrective actions by December 31, 2007, or provide justification for continued operation until those actions were completed (Reference 1).

On March 4 and September 1, 2005 PSEG submitted a listing of the actions being taking to address GL 2004-02 and updated the status of those actions in its letter of June 7, 2006 (References 2 and 3).

On February 9, 2006, the Commission issued a request for additional information (RAI) to the site to be answered within 60 days (Reference 6).

On March 28, 2006, the NRC issued a letter stating that licensees who installed their strainers in 2006 needed to submit the information to fully address GL 2004-02 by December 31, 2006 (Reference 4).

On January 4, 2007, the Commission issued a letter stating that it would allow licensees to include the RAI response in the final GL response for closure of all of the GSI-191 issues no later than December 31, 2007 (Reference 5).

On June 7, 2006, PSEG submitted an extension request for Salem Unit 2 steam generator insulation replacement until the end of the Spring 2008, refueling outage. On August 11, 2006, the NRC approved the extension request (Reference 7).

On August 15, 2007, PSEG submitted a Licensing Amendment Request for revision to the licensing basis for the Net Positive Suction Head available (NPSHa) for Emergency Core Cooling System (ECCS) and Containment Heat Removal System pumps as described in the Appendix 3A of the Salem Updated Final Safety Evaluation Report (UFSAR).
On November 15, 2007, NRC approved that license amendment request (References 8 and 9).

During the week of October 1, 2007, NRC performed an audit at Salem Generating Station. Based on the audit, NRC identified several open items. The open item responses will be included in the Generic Letter (GL) 2004-02 supplemental response. On October 24, 2007 the NRC issued the draft results of the Audit (Reference 10).

On November 21, 2007, the NRC issued a final copy of the "Content Guide for Generic Letter GL 2004-02 Responses" which was sent to NEI for distribution to all licensees (Reference 11).

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On November 30, 2007, the NRC issued " Supplemental Licensee Responses to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors." This letter allowed all Pressurized Water Reactor Licensees to extend their supplemental responses for up to two months beyond December 31, 2007 (i.e., to February 29, 2008) (Reference 12).

PSEG is committed to provide a supplemental response to GL 2004-02, including the RAI and audit open items, except as requested below by February 29, 2008 (Reference 12).

Requested Extension and Basis for the Proposed Extension

SECY-06-0078, "Status of Resolution of GSI-191, "Assessment of [Effect of] Debris Accumulation on PWR Sump Performance," dated March 31, 2006, specifies two criteria for short duration Generic Letter 2004-02 extensions, limited to several months. These two criteria are listed below.

Criterion 1: The licensee has a plant-specific technical/experimental plan with milestones and schedule to address outstanding technical issues with enough margins to account for uncertainties.

Criterion 2: The licensee identifies mitigative measures to be put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded ECCS and CSS functions during the extended period.

Salem is requesting extension for the following three outstanding technical issues:

1. Completion and evaluation of Salem's final chemical head loss test in the vendor's Multi-Functional Test Loop (MFTL),

2. Incorporation of the test results from the MFTL into the head loss and NPSH calculations,

3. Completion of Downstream Effects and In-Vessel Calculations.

Currently, PSEG is performing a series of tests in a MFTL at the CCI vendor facility. The test utilizes the Salem representative sump pool chemistry and debris loading in a proto-typical configuration. PSEG considers the test in this MFTL to model the Salem post-accident scenario. The results of the tests will establish a more specific basis for sump strainer NPSH and structural margin, including the effects of post-accident sump chemistry.

Upon completion of the testing, the formal documentation of the test report and associated calculations will be completed. In order to complete the aforementioned test in the MFTL and formal documentation, this submittal requests that the date for completing all corrective actions required by GL 2004-02 be extended to June 30, 2008.

Following is a plant specific technical/experimental plan with milestones and schedule to address the three outstanding technical issues.

1. Completion and Evaluation of Salem Chemical Test in MFTL

   The Salem Units 1 and 2 testing in MFTL will be done at the vendor (CCI) facility using Salem representative ECCS sump pool chemistry, postulated strainer debris loading, and chemicals.

   The Salem Units 1 and 2 testing will include the debris determined from the associated debris transport calculation.

   PSEG has performed chemical testing in the MFTL during December 2006. The test results showed that the head loss was within acceptable limits when initial containment air pressure was credited. These tests are being repeated to provide a proto-typical test configuration and to resolve some concerns from the NRC regarding testing methodology.

   The testing in the MFTL is scheduled to start during second week of December 2007 and is expected to be completed during the first quarter of 2008. Full evaluation and documentation of test results is expected to be completed by May 30, 2008.

2. Incorporation of the Test Results from MFTL into the Head Loss and NPSH Calculations

   Calculations and the supporting analyses and certifications will be revised by the vendor to incorporate the test results from the MFTL. The test results from the MFTL will then be provided to PSEG for review and to incorporate into the NPSH calculation. This activity will be completed by June 30, 2008.

   Currently, based on Salem specific calculations, a head loss margin of 3.6' for Unit 1 and 5.0' for Unit 2 is available at 190°F.

3. Completion of Downstream Effects Calculations

   The downstream effects calculation in accordance with WCAP 16406-P Revision 1 is currently in progress. The NRC has examined a draft of this calculation during the October 1, 2007 audit. A calculation based on WCAP 16406-P Revision 0 was previously completed. Additionally, the in-vessel evaluation based on WCAP 16793-NP Revision 0 is currently in progress. Both of these calculations will be completed by May 30, 2008.

Following is the detailed information on Criterion 2 of SECY-06-0078.

The following mitigative measures and compensatory actions have been implemented to minimize the risk of degraded ECCS and CSS functions during the requested extension period thus providing the required information for Criterion 2 of SECY-06-0078.

ECCS Design

The original containment sump strainer area for each Salem Unit was 85 square feet.

The new ECCS containment sump strainer modules installed at Salem Units 1 and 2 have a surface area is 4,854 square feet for Salem 1, and 4,656 square feet for Salem 2. The new surface area was based on debris load and impacted chemicals, as well as plant layout. The maximum number of strainer modules has been installed to ensure the ECCS sump will be able to perform its design safety function within acceptable margins to accommodate testing and/or analyses uncertainties. In addition to providing a significant increase in strainer surface area, the new design in both Units incorporates a reduction in strainer hole size from 1/8 inch nominal (original strainer) to 1/12 inch nominal (new strainer).

Additionally, a debris interceptor has been installed in front of the strainer modules to block debris, and two new level switches (in addition to the existing level transmitters) have been installed with greater accuracy (+/- ½") to provide the containment sump level.

A. Insulation Replacement

All the calcium silicate insulation within the Zone of Influence (ZOI) for Salem Units 1 and 2 has been replaced. Min K insulation was replaced with reflective metallic insulation wherever possible. In some cases NUKON insulation was used due to accessibility concerns. In all cases, the added NUKON and the remaining Min K insulation was accounted for in the debris generation calculation.

C. Programmatic Controls to Reduce Debris in Containment

Salem has provided programmatic controls to ensure that potential sources of debris that may be introduced into containment will be assessed for adverse effects on the ECCS and Containment Spray System recirculation functions. These programmatic controls include requirements related to coatings, containment housekeeping, materiel condition, and modifications. The programmatic controls are described below:

Salem has a containment coating program. The majority of the coatings inside of containment were procured and applied as qualified coatings. Qualified coatings are controlled under site procedures. The majority of unqualified coatings inside of containment are component Original Equipment Manufacturer coatings. During every refueling outage, a containment walk down is performed in accordance with the associated technical standard to determine the condition of the coatings and to take corrective actions as necessary.

At the end of an outage, a formal containment walkdown is performed utilizing the containment closeout surveillance procedure. The walkdown is performed to ensure that loose materials are removed and will not affect the ECCS sump. Loose items not removed require a documented evaluation to provide the basis for concluding that the item is acceptable to remain in containment. As part of containment closeout, each ECCS train containment sump and sump screens are inspected for damage and debris.

As part of the newly installed containment strainers, the design change process procedures are being revised (scheduled for issuance prior to December 31, 2007) to enhance the controls for introducing material in the Containment.

Qualitative Risk Assessment

As stated above, Salem Units 1 and 2 have installed the ECCS strainer modifications. The installed strainer surface area of 4,854 square feet at Salem Unit 1 and 4,656 square feet at Salem Unit 2 is substantially greater than original strainer surface area of 85 square feet at both Salem Units. A debris interceptor has been installed in both Units in front of the strainer modules to block debris. Also, all calcium silicate insulation within the Zone of Influence (ZOI) has been replaced.

Additionally, as a result of the ECCS strainer modification, design procedures are being revised to enhance the controls for introducing material in the Reactor Containment, and therefore minimizing any potential adverse effect with regard to debris sources and/or debris transport paths associated with the containment sump.

The only remaining items to be completed are the chemical testing, revision of associated calculations, and completion of downstream effect calculations. Based on previous testing, PSEG anticipates that the new testing will be acceptable, and the downstream effects evaluation will not result in any further plant modification.

PSEG performed head loss testing with chemical precipitants in the MFTL during December 2006. The initial test results indicated that the head loss was within acceptable limits when initial containment air pressure is credited. Based on a Salem specific calculation, a head loss margin of 3.6' for Unit 1 and 5.0' for Unit 2 is available at 190°F. As stated previously, the NRC has approved the Licensing Amendment Request to revise the licensing basis for the NPSHa for ECCS and Containment Heat Removal System pumps as described in the Appendix 3A of the Salem UFSAR.

The debris generation and transport calculations are complete. The NRC examined these calculations during the October 1, 2007 audit. The latent debris evaluation is complete. The containment walk down of Salem Unit 1 showed the latent debris was much less than 200 pounds. However, for conservatism, 200 pounds was used in the Salem Units 1 and 2 calculations. Chemical effects evaluation has been completed in accordance with WCAP 16530-NP.

The downstream effects calculation in accordance with WCAP 16406-P Revision 1 is currently in progress. NRC has examined the draft evaluation during the October 1, 2007 audit. The evaluation based on WCAP 16406-P Revision 0 was completed. The in-vessel evaluation based on WCAP 16793-NP Revision 0 is currently in progress.

A series of bench top Laboratory chemical tests have been performed to assure the correct chemical compositions are used in the MFTL chemical tests. The test results have been compared to the results in WCAP 16530-NP to assure the results are within an acceptable range of the WOG results.

Therefore, it is concluded that the risk associated with this requested extension to allow completion of the additional testing, the completion of associated calculations, and the completion of downstream effects evaluation is acceptably minimal.

Conclusion

PSEG is commited to provide the Generic Letter 2004-02 response by February 29, 2008, as allowed by NRC letter dated November 30, 2007 (Reference 12).

An extension of the Salem Unit 1 and 2 dates for the completion of all corrective actions required by Generic Letter 2004-02 is acceptable based on:

- The modified Salem Unit 1 and 2 ECCS Sump Strainers are installed.

- Salem has performed extensive debris generation and transport calculations to determine the amount of debris that could be transported to the containment sump. Based on this debris load and impacted chemicals, the maximum number of strainer modules (based on the plant layout) have been installed to ensure the ECCS sump will be able to perform its design safety function within acceptable margins to accommodate testing and/or analyses uncertainties.

- Salem Units 1 and 2 have procedures in place that ensure containment cleanliness. Salem is in the process of revising existing procedures to enhance controls to avoid introducing any material that has negative impact on the containment sump performance. These revisions are scheduled to be completed by December 31, 2007.

- Salem has previously performed some chemical testing in the MFTL at the vendor facility. These tests showed that the head loss was within the acceptable limits. In order to provide a better proto typical layout, additional testing is being scheduled. This configuration is designed to provide a highly representative post-accident sump environment and sump strainer challenge for the Salem Units.

- Insights gained from Salem's previous chemical effects testing provide high confidence that the final test in the MFTL will yield acceptable NPSH and structural margin on the modified strainer assembly.

Based on these factors, and PSEG's commitment to provide an accurate and complete response commensurate with the significance of GSI 191, an extension to June 30, 2008 is prudent.

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References: (1) NRC Generic Letter 2004-02 "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004.

(2) Letter from PSEG to NRC: "90-Day Response to Generic Letter 2004-02 Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors, Salem Nuclear Generating Station, Units 1 and 2, Facility Operating License Nos. DPR-70 and DPR-75, Docket Nos. 50-272 and 50-311," dated March 4, 2005.

(3) Letter from PSEG to NRC: "Response to Generic Letter 2004-02 Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors, Salem Nuclear Generating Station, Units 1 and 2, Facility Operating License Nos. DPR-70 and DPR-75, Docket Nos. 50-272 and 50-311," dated September 1, 2005.

(4) Letter from NRC to Holders of Licenses for Pressurized-Water Reactors: "Alternative Approach for Responding to The Nuclear Regulatory Commission Request for Additional Information Letter Re: Generic letter 2004-02," dated March 28, 2006.

(5) Letter from NRC to Holders of Licenses for Pressurized-Water Reactors: "Alternative Approach for Responding to The Nuclear Regulatory Commission Request for Additional Information Letter Regarding Generic letter 2004-02," dated January 4, 2007.

(6) Letter from NRC to Mr. William Levis: "Salem Nuclear Generating Station, Units 1 & 2 Request for Additional Information Re: Response to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design-Basis Accidents at Pressurized-Water Reactors" (TAC Nos. MC4712 and MC4713)," dated February 9, 2006.

(7) Letter from PSEG to NRC: "Updated Response to Generic Letter 2004-02 and Request for Extension for Insulation Replacement Salem Generating Station – Unit 2, Docket No. 50-311, Facility Operating Licenses DPR-75," dated June 7, 2006.

(8) Letter From PSEG to NRC "License Amendment Request LAR S07-05 Revision to Licensing Basis – NPSH Methodology For ECCS Pumps," dated August 15, 2007.

(9) Letter from NRC to Mr. William Levis "Salem Nuclear Generating Station, Units Nos. 1 and 2. Issuance of Amendments Re: Revision to Licensing Basis – Net Positive Suction Head Methodology for Emergency Core Cooling System Pumps (TAC Nos. MD6353 and MD6354)," dated November 15, 2007.

(10) Letter from Michael L. Scott (NRC Safety Issue Resolution Branch) to Harold Chernoff (NRC Plant Licensing Branch I-2) "Salem Units 1 and 2 Draft Open Items from Staff Audit of Corrective Actions to Address Generic Letter 2004-02 (TAC Nos.MC4712 and Report MC4713)," dated October 24, 2007.

(11) Letter from William H. Ruland to Mr. Anthony Pietrangelo "Revised Content Guide for Generic Letter 2004-02 Supplemental Responses," dated November 21, 2007.

(12) On November 30, 2007, (Reference 12) the NRC issued " Supplemental Licensee Responses to Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized-Water Reactors." This letter allowed all Pressurized Water Reactor Licensees to extend their supplemental responses for up to months beyond December 31, 2007 (i.e., to February 29, 2008).

Attachment 2
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List of Commitments
Salem Generating Station Units 1 and 2

The following table identifies those actions committed to by PSEG. Any other statements in this letter are provided for information purposes and are not considered regulatory commitments.

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (YES/NO)	PROGRAM-MATIC (YES/NO)
Salem is requesting extension for the following three outstanding technical issues: 1. Completion and evaluation of Salem's final chemical head loss test in the vendor's Multi- Functional Test Loop (MFTL), 2. Incorporation of the test results from the MFTL into the head loss and NPSH calculations, 3. Completion of Downstream Effects and In-Vessel Calculations Upon completion of the testing, the formal documentation of the test report and associated calculations will be completed. PSEG will revised its response to GL 2004-02 no later than June 30, 2008	June 30, 2008	Yes	No