November 22, 2002

Mr. Harold W. Keiser
Chief Nuclear Officer & President
PSEG Nuclear LLC - X04
Post Office Box 236
Hancocks Bridge, NJ  08038

SUBJECT: BULLETIN 2002-01, “REACTOR PRESSURE VESSEL HEAD DEGRADATION AND REACTOR COOLANT PRESSURE BOUNDARY INTEGRITY,” 60-DAY RESPONSE FOR SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION (TAC NOS. MB4573 AND MB4574)

Dear Mr. Keiser:

On March 18, 2002, the Nuclear Regulatory Commission (NRC) issued Bulletin 2002-01, “Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity,” to all holders of operating licenses for pressurized water reactors (PWRs). Within 60 days of the date of this bulletin, all PWR addressees were required to submit to the NRC the following information related to the reactor coolant pressure boundary (RCPB) other than the reactor pressure vessel head:

> The basis for concluding that your boric acid inspection program is providing reasonable assurance of compliance with the applicable regulatory requirements discussed in Generic Letter 88-05 and this bulletin. If a documented basis does not exist, provide your plans, if any, for a review of your programs.

The NRC staff has evaluated the licensees’ 60-day responses to Bulletin 2002-01 concerning the rest of the RCPB and concluded that most of the licensees’ 60-day responses lacked specificity. Therefore, the NRC staff could not complete its review of the boric acid corrosion control (BACC) programs in light of the lessons learned from the Davis-Besse event. The information request in Bulletin 2002-01 may not have been sufficiently focused, which, in part, may explain the lack of clarity in the licensees’ 60-day responses. The NRC staff’s review of the licensees’ 60-day responses provided the basis for development of the questions in this request for additional information (RAI). Licensees are expected to provide responses in sufficient detail to facilitate a comprehensive staff review of their BACC programs.

The NRC is not imposing new requirements through the issuance of Bulletin 2002-01 or this RAI. The NRC staff's review of the information collected will be used as part of the decisionmaking process regarding possible changes to NRC regulations and the inspection of BACC programs. The NRC staff has, however, concluded that a comprehensive BACC program would exceed the current American Society of Mechanical Engineers Code requirements and would include, but is not limited to, the following:

1. The BACC program must address, in detail, the scope, extent of coverage, degree of insulation removal, and frequency of examination for materials susceptible to boric acid corrosion. The BACC program would also ensure that any boric acid leakage is identified before significant degradation occurs that may challenge structural integrity.

    a. The scope should include all components susceptible to boric acid corrosion (BAC) and identify the type of inspection(s) performed (e.g., VT-2 or VT-3 examination).

    b. The technical basis for any deviations from inspection of susceptible materials and mechanical joints must be clearly documented.

    c. As stated in Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," the BACC program should identify the principal locations where leaks that are smaller than the allowable technical specification limit have the potential to cause degradation of the primary pressure boundary by boric acid corrosion. Particular consideration should be given to identifying those locations where conditions exist that could cause high concentrations of boric acid on pressure boundary surface, or locations that are susceptible to primary water stress corrosion cracking (Alloy 600 base metal and dissimilar metal Alloy 82/182 welds), or susceptible to leakage (e.g., valve packing, flange gaskets).

    d. For inaccessible components (e.g., buried components, components within rooms, vaults, etc.) the degree of inaccessibility, and the type of inspection that would be effective for examination of the area, must be clearly defined. In addition, identify any leakage detection systems that are being used to detect potential leakage from components in inaccessible areas.

    e. The technical basis for the frequency of implementing the BACC program must be clearly documented.

2. The examiners would be VT-2 qualified at a minimum, and would be trained to recognize that very small volumes of boric acid leakage could be indicative of significant corrosion.

3. The BACC program would ensure that any boric acid leakage is identified before significant degradation occurs that may challenge structural integrity. If observed leakage from mechanical joints is not determined to be acceptable, the appropriate corrective actions must be taken to ensure structural integrity. Evaluation criteria and procedures for structural integrity assessments must be specified. The applicable acceptance standards and their bases must also be identified.

4. Leakage from mechanical joints (e.g., bolted connections) that is determined to be acceptable for continued operation must be inspected and monitored in order to trend/evaluate changes in leakage. The bases for acceptability must be documented. Any evaluation for continued service should include consideration of corrosion mechanisms and corrosion rates. If boric acid residues are detected on components,

the leakage source shall be located by removal of insulation, as necessary. Identification of the type of insulation and any limitations concerning its removal should be addressed in the BACC program.

5. Leakage identified outside of inspections for BAC should be integrated into the BACC program.

6. Licensees would routinely review and update the BACC program in light of plant-specific and industry experience, monitoring and trending of past leakage, and proper documentation of boric acid evaluations to aid in determination of recurring conditions and root cause of leakage. New industry information should be integrated in a consistent manner such that revised procedures are clear and concise.

Please consider the above attributes in providing your responses to the enclosed RAI.

This request was discussed with John Nagle of your staff on November 14, 2002, and it was agreed that a response would be provided within 60 days of receipt of this letter.

If you have any questions, please contact me at (301) 415-1324.

Sincerely,

***/RA/***

Robert J. Fretz, Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosure: RAI

cc w/encls: See next page

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REQUEST FOR ADDITIONAL INFORMATION (RAI)

REGARDING BORIC ACID CORROSION CONTROL PROGRAMS

SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-272 AND 50-311

The format provided in Table A may be used to respond to the following RAI questions:

1. Provide detailed information on, and the technical basis for, the inspection techniques, scope, extent of coverage, and frequency of inspections, personnel qualifications, and degree of insulation removal for examination of Alloy 600 pressure boundary material and dissimilar metal Alloy 82/182 welds and connections in the reactor coolant pressure boundary. Include specific discussion of inspection of locations where reactor coolant leaks have the potential to come in contact with and degrade the subject material (e.g., reactor pressure vessel bottom head).

2. Provide the technical basis for determining whether or not insulation is removed to examine all locations where conditions exist that could cause high concentrations of boric acid on pressure boundary surfaces or locations that are susceptible to primary water stress corrosion cracking (Alloy 600 base metal and dissimilar metal Alloy 82/182 welds). Identify the type of insulation for each component examined, as well as any limitations to removal of insulation. Also include in your response actions involving removal of insulation required by your procedures to identify the source of leakage when relevant conditions (e.g., rust stains, boric acid stains, or boric acid deposits) are found.

3. Describe the technical basis for the extent and frequency of walkdowns and the method for evaluating the potential for leakage in inaccessible areas. In addition, describe the degree of inaccessibility, and identify any leakage detection systems that are being used to detect potential leakage from components in inaccessible areas.

4. Describe the evaluations that would be conducted upon discovery of leakage from mechanical joints (e.g., bolted connections) to demonstrate that continued operation with the observed leakage is acceptable. Also describe the acceptance criteria that were established to make such a determination. Provide the technical basis used to establish the acceptance criteria. In addition,

   a. if observed leakage is determined to be acceptable for continued operation, describe what inspection/monitoring actions are taken to trend/evaluate changes in leakage, or

   b. if observed leakage is not determined to be acceptable, describe what corrective actions are taken to address the leakage.

5. Explain the capabilities of your program to detect the low levels of reactor coolant pressure boundary leakage that may result from through-wall cracking in the bottom

reactor pressure vessel head incore instrumentation nozzles. Low levels of leakage may call into question reliance on visual detection techniques or installed leakage detection instrumentation, but has the potential for causing boric acid corrosion. The NRC has had a concern with the bottom reactor pressure vessel head incore instrumentation nozzles because of the high consequences associated with loss of integrity of the bottom head nozzles. Describe how your program would evaluate evidence of possible leakage in this instance. In addition, explain how your program addresses leakage that may impact components that are in the leak path.

6. Explain the capabilities of your program to detect the low levels of reactor coolant pressure boundary leakage that may result from through-wall cracking in certain components and configurations for other small diameter nozzles. Low levels of leakage may call into question reliance on visual detection techniques or installed leakage detection instrumentation, but has the potential for causing boric acid corrosion. Describe how your program would evaluate evidence of possible leakage in this instance. In addition, explain how your program addresses leakage that may impact components that are in the leak path.

7. Explain how any aspects of your program (e.g., insulation removal, inaccessible areas, low levels of leakage, evaluation of relevant conditions) make use of susceptibility models or consequence models.

8. Provide a summary of recommendations made by your reactor vendor on visual inspections of nozzles with Alloy 600/82/182 material, actions you have taken or plan to take regarding vendor recommendations, and the basis for any recommendations that are not followed.

9. Provide the basis for concluding that the inspections and evaluations described in your responses to the above questions comply with your plant Technical Specifications and Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55(a), which incorporates Section XI of the American Society of Mechanical Engineers Code by reference. Specifically, address how your boric acid corrosion control program complies with ASME Section XI, paragraph IWA-5250 (b) on corrective actions. Include a description of the procedures used to implement the corrective actions.

Table A. Template for Response to RAI Questions

| Component | Inspection Techniques | Personnel Qualifications | Extent of Coverage | Frequency | Degree of Insulation Removal/Insulation Type | Corrective Action |
|---|---|---|---|---|---|---|
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Salem Nuclear Generating Station,
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cc:

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