February 5, 2007

Mr. William Levis
Senior Vice President & Chief Nuclear Officer
PSEG Nuclear LLC - N09
Post Office Box 236
Hancocks Bridge, NJ 08038

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION, AMENDMENT REQUEST RE: REFUELING OPERATIONS - DECAY TIME, SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2, (TAC NOS. MD2740 AND MD2741)

Dear Mr. Levis:

By letter dated August 4, 2006, PSEG Nuclear LLC (PSEG) submitted an amendment request for Salem Nuclear Generating Station, Unit Nos. 1 and 2 (Salem). The proposed amendment would revise the Technical Specifications to allow the movement of irradiated fuel inside containment to commence at 24 hours after shutdown or at the decay time calculated using the licensee's spent fuel pool integrated decay heat management program, whichever is later.

The Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). The RAI questions were previously provided in draft form to PSEG via e-mail on January 8, 2007. A conference call between the NRC staff and the PSEG staff to discuss the questions was held on January 19, 2007.

During a telephone call on January 31, 2007, Mr. Jamie Mallon of your staff agreed to provide a response by February 28, 2007. Mr. Mallon also clarified that issuance of the amendment is no longer needed by March 1, 2007, to support the Salem Unit 1 spring 2007 refueling outage, as discussed in your application. Mr. Mallon indicated that the amendment would be needed for the Salem Unit 2 spring 2008 refueling outage.

Please note that if you do not respond within 30 days from the date of this letter or provide an acceptable alternate date in writing, we may reject your application for amendment under the provisions of Title 10 of the *Code of Federal Regulations*, Section 2.108. If you have any questions, I can be reached 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:
Request for Additional Information

cc w/encl: See next page

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Richard B. Ennis, Senior Project Manager
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Docket Nos. 50-272 and 50-311

Enclosure:
Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING PROPOSED LICENSE AMENDMENT

REFUELING OPERATIONS - DECAY TIME

SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-272 AND 50-311

By letter dated August 4, 2006, PSEG Nuclear LLC (the licensee) submitted an amendment request for Salem Nuclear Generating Station, Unit Nos. 1 and 2 (Salem). The proposed amendment would revise the Technical Specifications (TSs) to allow the movement of irradiated fuel inside containment to commence at 24 hours after shutdown or at the decay time calculated using the licensee's spent fuel pool (SFP) integrated decay heat management (IDHM) program, whichever is later.

The Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has determined that additional information is needed to complete its review. The specific information requested is addressed below.

Background

Attachment 5 to your letter dated August 4, 2006 (Calculation S-C-SF-MEE-1679, Revision 1), evaluates the cooling capability of the spent fuel pool cooling system (SFPCS). Section 4.1 of Attachment 1 to your letter states, "The evaluation (Attachment 5) demonstrates that a fully radiated 193 element reactor core can be off-loaded to either Salem spent fuel pool with 85-hours of in vessel decay provided the CCW [component cooling water] outlet temperature is less than or equal 71 °F." The NRC staff review noted the following issues in review of the calculation regarding whether an 85-hour delay time is conservative for the conditions stated:

a) Tables 3 and 4 of the calculation show switching of SFPCS heat exchanger alignment many times at various and predictable time intervals to remove decay heat after full core offload. In Table 3 for normal two heat exchanger operations, the SFPCS is switched from normal operation to parallel heat exchanger operation back and forth to maintain both SPFs below 149 °F. In Table 4 for one heat exchanger operation, the SFPCS is switched from cross-connect heat exchanger operation on one SFP to normal operations on the other SFP back and forth to maintain both SFPs below 180 °F. The "Time to Switch HX" time intervals early in the sequences shown in Tables 3 and 4 seem short, especially in Table 4.

   Considering the time required to change the SFP cooling alignment, the NRC staff is concerned whether the heat exchanger switching operations can be performed as listed in Tables 3 and 4 per procedures without exceeding SFP temperature limits of 149 °F and 180 °F as specified in the Updated Final Safety Analysis Report (UFSAR).

b) Where referring to the stated conservatisms of the calculation, Section 4.1 of Attachment 1 to your letter states, “These inherent conservatisms are of sufficient magnitude to account for any foreseeable changes in river water temperature or other non-conservative assumptions.” The NRC staff raises the following concerns regarding this statement:

1) From Figure 9.1-5 of the UFSAR, it appears that there would not be appreciable natural circulation cooling from the reactor vessel to the SFP while residual heat removal cooling of the reactor vessel with all the fuel elements removed.

2) Section 4.1 of Attachment 1 (itemized conservatism 1) states, in part, that: “Consequently, if the pool reaches 180 °F, evaporative cooling plus makeup heating removes approximately 9% of the peak heat…” This does not seem to be a conservatism because, as is stated in your letter and the calculation, evaporative cooling is considered in the one heat exchanger case.

3) Calculation S-C-SF-MEE-1679 computes bulk SFP temperature (assumes instantaneous mixing) and computes heat exchanger switching operations and minimum decay time using the UFSAR temperature limits of 149 °F and 180 °F. If SFP temperature gradients exist, this does not seem conservative.

4) Calculation S-C-SF-MEE-1679, Revision 1, takes credit for the volume of the transfer pool. Revision 0 did not take credit for the transfer pool. Adding the transfer pool increases the available heat capacity by more than 50% per Section 3.2.14 of the calculation. It is questionable whether crediting the volume of the transfer pool in a calculation that uses bulk temperature (instantaneous mixing) while using the UFSAR temperature limits of 149 °F and 180 °F is conservative.

<u>Questions</u>

Based on the above issues, the NRC staff requests the following additional information:

1) When determining the minimum decay time, how does the IDHM program account for the time needed to switch the heat exchanger alignment of the SFPCS back and forth similar to what is required in Calculation S-C-SF-MEE-1679, Revision 1?

2) How much time do the operators need to align the SFPCS for the various configurations required in Tables 3 and 4 of Calculation S-C-SF-MEE-1679, Revision 1?

3) The “Time to Switch HX” column in both Tables 3 and 4 of Calculation S-C-SF-MEE-1679, Revision 1 appears to be dependent on the “Tube Flow” values in Table 2, which are 2500 gallons per minute (gpm) and 1500 gpm. How accurate are these two flow rates as compared to actual SFPCS flow rates? Does the IDHM use actual SFPCS flow as determined by either actual measurement or by a flow model?

4) The amendment request proposes to revise TS Limiting Condition for Operation (LCO) 3.9.3 to reference the IDHM program as the means to determine the LCO decay time. Title 10 of the *Code of Federal Regulations* Section 50.36(c)(5) requires, in part, that the TSs contain administrative controls relating to procedures necessary to assure operation of the facility in a safe manner. Consistent with these requirements, the IDHM program should be added to TS Section 6.0, “Administrative Controls.” Please submit your IDHM program for review and revise TS Section 6.0 accordingly.