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

February 17, 2016

Mr. Robert Braun
President and Chief Nuclear Officer
PSEG Nuclear LLC - N09
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING CHILLED WATER SYSTEM MODIFICATIONS (CAC NOS. MF6724 AND MF6725)

Dear Mr. Braun:

By letter dated September 11, 2015 (Agencywide Documents Access and Management System Accession No. ML15254A387), as supplemented by letter dated November 5, 2015 (ADAMS Accession No. ML15309A750), PSEG Nuclear LLC (PSEG, the licensee) submitted a license amendment request for Salem Nuclear Generating Station, Unit Nos. 1 and 2. The proposed amendment would revise the technical specifications to support planned plant modifications to implement chiller replacements and for performing maintenance on common line components.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's application and, based upon this review, determined that additional information is needed, as set forth in the enclosed Request for Additional Information (RAI). On January 11, 2016, and January 27, 2016, a draft of these questions was sent to Mr. Paul Duke of your staff to ensure that the questions were understandable, the regulatory basis for the questions was clear, there is no proprietary information contained in the RAI, and to determine if the information was previously docketed. On February 4, 2016, Mr. Brian Thomas of your staff indicated that PSEG will submit a response by March 31, 2016.

If you have any questions, please contact me at 301-415-1603 or Carleen.Parker@nrc.gov.

Sincerely,

Carleen J. Parker, 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/enclosure: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

CHILLED WATER SYSTEM MODIFICATIONS

PSEG NUCLEAR LLC

SALEM NUCLEAR GENERATION STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-272 AND 50-311

By letter dated September 11, 2015 (Agencywide Documents Access and Management System Accession No. ML15254A387), as supplemented by letter dated November 5, 2015 (ADAMS Accession No. ML15309A750), PSEG Nuclear LLC (PSEG, the licensee) submitted a license amendment request (LAR) for Salem Nuclear Generating Station (Salem), Unit Nos. 1 and 2. The proposed amendment would revise the technical specifications (TSs) to support planned plant modifications to implement chiller replacements and for performing maintenance on common line components.

Specifically, the proposed amendment would revise TS 3/4.7.10 to allow for:

(1) planned chiller replacement (three per unit for a total of six chillers), and
(2) maintenance on common chilled water components with operating a unit cross-tie.

In addition, the proposed amendment would revise TS 3/4.7.6 to add a note stating that certain alignments of the control room emergency air conditioning system (CREACS) are only permitted when in the chiller unit cross-tie configuration.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's application and, based upon this review, determined that additional information is needed, as set forth below.

## Request for Additional Information (RAI)

**RAI-SBPB-CROSS-TIE-1**

BACKGROUND:

PSEG stated in the application that the cross-tie valves (1CH63 and 1CH78) are manual valves and will remain manual valves with the proposed TS changes. Prior to use of the cross-tie, the valves and cross-tie line-up will be tested to confirm required performance.

PSEG stated in the supplemental letter dated November 5, 2015, that a failure modes and effects analysis (FMEA) was performed on the chilled water system cross-tie and that FMEA is consistent with NUREG-0800, "Standard Review Plan," Chapter 9, Section 9.2.7, "Chilled Water" (ADAMS Accession No. ML14093A350). In addition, PSEG stated that once opened, there is no failure mechanism that will cause either of these valves to go closed. Administrative controls will be established to ensure the valves stay open for the duration of the cross-tie as needed.

PSEG also stated the applicable regulatory requirements include Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants," General Design Criteria (GDC) 44. In Section 5.2 of the LAR, it states:

> GDC 44 - Cooling water
>
> A system to transfer heat from structures, systems, and components important to safety, to an ultimate heat sink shall be provided. The system safety function shall be to transfer the combined heat load of these structures, systems, and components under normal operating and accident conditions.
> Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished, assuming a single failure.

ISSUE:

As stated in 10 CFR 50, Appendix A:

> A single failure means an occurrence which results in the loss of capability of a component to perform its intended safety functions. Multiple failures resulting from a single occurrence are considered to be a single failure. Fluid and electric systems are considered to be designed against an assumed single failure if neither (1) a single failure of any active component (assuming passive components function properly) nor (2) a single failure of a passive component (assuming active components function properly), results in a loss of the capability of the system to perform its safety functions.

The staff understands that the cross-tie valves 1CH63 and 1CH78 have been closed for the life of the plant (over approximately 25 years). The condition of the manual cross-tie valves to open, remain open, and perform a passive safety function need to be verified.

Industry events have identified passive component failures with valve stem to disc separation. Some industry valves in water systems have been known to be highly susceptible to disc/stem separation. In the case of this proposed unit cross-tie manual valve failure going from a full open to a closed position, it would result in a complete loss of chilled water to one unit (reference 2005 LaSalle County Station Inspection Report 2005002).

RAI:

Provide justification for the statement that once opened, there is no failure mechanism that will cause either of these valves to go closed.

In addition, for configuration c (the cross-tie configuration), please:

a. Describe FMEA for these valves that includes passive failure causing either CH63 or CH78 to go closed.
b. Based on the response to item a., describe if CH63 and CH78 should be replaced with a new configuration, thus removing the possibility of a single failure isolating flow to one unit.
c. With an accident on one unit, describe the plant consequence if one of the cross-tie valves was to fail closed.
d. Describe how plant operators would know (for example, alarms) if one of the cross-tie valves (CH63 and CH78) was to fail closed.
e. Describe the inspection plan (for example, internal valve inspections) and test plan to verify operability of CH63 and CH78.
f. Describe the TS surveillance requirements (SRs) for these valves (CH63 and CH78).
g. Describe procedures for operator actions in the event that one of the cross-tie valves fails closed (postulating valve stem-disc separation).
h. Describe the administrative controls that will maintain the valve open.
i. Describe if the manual valves have remote position indicators, and if so, the testing that is performed to verify the indications.
j. Describe if there are other passive failures that would result in a complete loss of auxiliary building (AB) chilled water (CH) system function to one unit. Based on the staff's review of Salem's piping diagrams, focus on the following manual valves: 1CH62, 1CH17, 2CH17, and 2CH77.

**RAI-SBPB-CROSS-TIE-2**

BACKGROUND:

PSEG stated in the letter dated September 11, 2015, that the reason for the unit cross-tie request was to permit maintenance on common line AB CH components. Common line components are components on lines that require the removal of a single unit's chillers/pumps in order to perform maintenance. To reduce demand on the AB CH system when in the reduced equipment and cross-tied configurations, upgrades and maintenance will be performed during cooler portions of the year consistent with the operating restrictions proposed for the TSs.

ISSUE:

Details are missing on what common line components need to have maintenance performed and how this maintenance was previously performed.

RAI:

Describe details of the need to have the AB CH cross-tie and why this is preferred over the previous practice.

**RAI-SBPB-CROSS-TIE-3**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration c is proposed to allow chiller maintenance on common components. PSEG stated that calculations model this configuration.

PSEG also stated in the Section 5.2 of the LAR that the applicable regulatory requirements and criteria included GDC 46, "Testing of cooling water system," which states:

> The cooling water system shall be designed to permit appropriate periodic pressure and functional testing to assure (1) the structural and leaktight integrity of its components, (2) the operability and the performance of the active components of the system, and (3) the operability of the system as a whole and, under conditions as close to design as practical, the performance of the full operational sequence that brings the system into operation for reactor shutdown and for loss-of-coolant accidents, including operation of applicable portions of the protection system and the transfer between normal and emergency power sources.

ISSUE:

The LAR does not describe the field testing that will take place that validates the calculation/model for TS 3/4.7.10, configuration c.

RAI:

Describe the field testing that will take place that validated the calculation/model for configuration c. This should include, but not be limited to:

- Near the upper band of service water (SW) temperature for April conditions (highest heat sink temperature).
- Two chiller operations (assuming three chiller operations with single failure of one chiller).
- Emergency control air compressors (ECACs) isolation (SW in standby mode).
- ECAC operation with SW as a heat sink.
- Non-essential heat loads isolated on both units.
- CREACS in operations per TS 3/4.7.6.1 NOT in single filtration train alignment.
- Cross-tie valves open.
- Testing of bounding combinations of old and new chillers.

**RAI-SBPB-CROSS-TIE-4**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration c is proposed to allow maintenance on common components. PSEG stated that calculations modeled this configuration for unit cross-tie.

The existing TS 3/4.7.10 requires that with one chiller water pump inoperable, the chiller water pumps be restored to operable status within 7 days.

ISSUE:

The LAR does not describe actions for when the plant has entered TS 3/4.7.10 - configuration c to perform maintenance on common chiller components with all the applicability conditions met, then later (during maintenance on the common chiller components), one of the chillers or chiller pumps becomes inoperable.

RAI:

Clarify the actions that would occur if configuration c was no longer met (for example, one of three chillers or one of two chilled water pumps was to become inoperable while in configuration c (maintenance)).

Specifically address, why while in configuration c with two of the required chillers becoming inoperable, 72 hours is an acceptable duration for return to service of one chiller.

**RAI-SBPB-CROSS-TIE-5**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration c is proposed to allow maintenance on common components. The proposed configuration c allows the cross-tie to be open between units so that three chillers support the heat loads of both units.

The Salem Updated Final Safety Analysis Report (UFSAR), Section 13.1.1.1, "Engineering," states the engineering director's responsibilities include the maintenance rule program.

The regulation in 10 CFR 50.65(a)(4) states:

> Before performing maintenance activities (including but not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance), the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activities. The scope of the assessment may be limited to structures, systems, and components that a risk-informed evaluation process has shown to be significant to public health and safety.

PSEG procedure OU-AA-103, "Shutdown Safety Management Program," states that protected equipment is equipment (or systems) whose availability has been physically identified as essential to ensure that a key safety function is maintained.

ISSUE:

The Maintenance Rule regulation is referenced in the Salem UFSAR, including the requirements of 10 CFR 50.65(a)(4), which involve online risk assessment. Both of the Salem, Unit Nos. 1 and 2 chilled water system - AB subsystems, consist of three chillers. In the cross-tie configuration, three chillers will be removed from service. The stations risk profile was not described in the LAR.

RAI:

a. Describe the risk assessment (10 CFR 50.65 (a)(4)) for each unit when in configuration c unit cross-tie. Specifically, describe the results related to core damage frequency and large early release frequency.
b. Describe Salem's program related to protected equipment. Specifically, when using the cross-tie, describe the major mechanical and electrical equipment that will be 'protected' against inadvertent operations, inadvertent testing, inadvertent tag-out (lock-out), or inadvertent maintenance that could place the plant at risk.

**RAI-SBPB-6**

BACKGROUND:

PSEG stated in the supplemental letter dated November 5, 2015, that an expansion tank is installed at the suction of the pumps to accommodate chilled water inventory, thermal expansion, and to provide adequate net positive suction head for the chilled water pumps. In addition, it was stated that FMEA S-C-CH-MEE-1139, Revision 1, dated December 10, 1998, was assessed in a technical evaluation for the new chilled water configurations, which include the potable water and nitrogen system.

PSEG also stated in the LAR under proposed TS 3/4.7.10, configuration b, item 4c and configuration c, item 3 that non-essential heat loads are isolated from the chilled water system on both units. Proposed TS 3/4.7.10 SRs (item d(iii)) and 10c (item e(ii)) also have a similar statement that non-essential heat loads are isolated from the chilled water system.

ISSUE:

Standard Review Plan 9.2.7 states, in part, that the system is designed to provide water makeup as necessary. Closed-loop systems with surge tanks (also referred to as expansion tanks) should have sufficient capacity to accommodate expected leakage from the system for 7 days, or a safety-related Seismic Category I automatic source of makeup can be made available within a timeframe consistent with the surge tank capacity (the time period is initiated at the actuation of the low level alarm). Surge tank leakage over a 7-day period should include the possibility of valve seat leakage for chilled water system boundaries, chilled water pump seal leakage, equipment gaskets, and general valve packing leakage.

For the proposed configuration c, only one expansion tank will be aligned for dual unit operations.

RAI:

Describe the design bases of the expansion tank for each unit and sizing for system leakage. Specifically, address if system leakage exceeds water makeup rates when aligned for new configurations b and c. This should include calculations and the following information:

a. Describe the design and usable volume (gallons) of the two unit expansion tanks.
b. Describe the normal leakage rate gallons per minute (gpm) for each unit and how expansion tank water makeup is achieved. Provide historical data to support existing leakage.
c. Describe the accident leakage rate (gpm) for each unit and how expansion tank water makeup is achieved assuming loss of offsite power (LOOP).
d. Describe the expected leakage rate when in new configuration b, since non-essential loads, emergency control air compressor (ECAC), and one chiller is isolated with boundary valves on one unit, assuming LOOP. Leakage should include worst conditions with SW in service and not in service to the ECAC.
e. Describe the expected leakage rate, with one expansion tank now in service for two units of chilled water system leakage when in new configuration c, since non-essential loads and ECAC are isolated on both units, assuming LOOP. Leakage should include worst conditions with SW in service and not in service to the ECAC.
f. Describe the test plan or field verification (or new TS surveillance) for system leak rate while in the cross-tie configuration so that the system leakage remains bounding for all conditions, given a LOOP.
g. Describe all design or operational changes that are needed to the chilled water expansion tank and potable water makeup flow rates (assuming LOOP) to support possible new leakage rates when in new configurations b and c.

**RAI-SBPB-7**

BACKGROUND:

PSEG stated in the LAR under proposed TS 3/4.7.10, configuration b, item 4c and configuration c, item 3 that non-essential heat loads are isolated from the chilled water system on both units. Proposed TS 3/4.7.10 SRs (item d(iii)) and 10c (item e(ii))) also have a similar statement on non-essential heat loads that are isolated from the chilled water system.

ISSUE:

The specific heat loads that are to be isolated and details of how the isolation is accomplished are missing from the LAR.

RAI:

Describe the non-essential heat loads that will be isolated for configurations b and c and the two SRs. Include the following information:

a. Describe the specific valve numbers that isolated those non-essential heat loads (include both units).
b. Describe the assumed valve seat leakage for these boundary valves and if this has been assumed in design calculation for expansion tank sizing.
c. Based on the response to item b., describe changes that are needed to the chilled water expansion tank and potable water makeup flow rates (assuming LOOP or loss of instrument air) to support new leakage rates.
d. Describe if there is a plan to field verify (testing) that the new boundary valve assumed seat leaking remains bounding.
e. Describe how plant operators will know what loads have to be isolated and where this information can be found (i.e., UFSAR, TS Bases, procedures, etc.).

**RAI-SBPB-8**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, configuration b, item 4b, that the opposite unit has to be in Limiting Condition for Operation (LCO) 3.7.10a configuration.

ISSUE:

Details are missing for the condition in which LCO 3.7.10a cannot be met for one unit while the other unit is in Applicability b. For instance, if TS 3/4.7.10, Applicability b is entered for Unit No. 2 and Applicability a is initially met for Unit No. 1, but then one or both of the operable chillers becomes inoperable at some later time (this is just one example).

RAI:

Describe all combinations of actions that will be taken while in either configurations b or c when the applicability conditions can no longer be satisfied. Specifically, address whether a new LCO is needed for these conditions. Clarify if the proposed actions and/or LCO 3.0.3 (shutdown actions) is entered for this condition. Please include the items below in your discussion:

a. ECAC becomes unisolated (b.2) and (c.2).
b. Chilled water flow becomes unisolated to the third chiller (b.3).
c. Control room emergency air condition system is not in single alignment (b.4).
d. Opposite unit does not meet LCO 3.7.10a (b.4.b).
e. Non-essential loads are not isolated (b.4.c) (c.3).
f. Chilled water valves are not full open (c.5).
g. Low expansion tank level.

**RAI-SBPB-9**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, configurations b and c, item 1, that the time duration starts November 1 and runs through April 30 in all modes. Proposed SRs are described for:

d. When in the LCO 3.7.10b configuration verify once per 24 hours:
   (i) The Unit 1 [2] ECAC is isolated from the chilled water system,
   (ii) Chilled water flow is isolated to the third chiller that is not in service and,
   (iii) If CREACS is in single filtration alignment verify non-essential heat loads are isolated from the chilled water system on BOTH units.

e. When in the LCO 3.7.10c configuration verify once per 24 hours:

   (i) The Unit 1 and Unit 2 ECACs are isolated from the chilled water system,
   (ii) Non-essential heat loads are isolated from the chilled water system and,
   (iii) Cross-tie valves are verified OPEN.

ISSUE:

The estimated time-line and replacement details for the chiller replacement were not described in the LAR. For example, under configuration b, if the chiller replacement was to begin on April 1 with an expected work duration of 30-40 days, the administrative controls that are in place to prevent exceeding April 30 would need to be identified.

RAI:

a. Describe the hours planned for one chiller replacement (worst condition). Provide best known time-line based on plant experiences and/or industry bench marking for safety-related chillers. Provide detailed time-line duration (for example, safety tag-outs, chiller skid change out, contingencies, testing, instrumentation and controls verification, refrigerant charging, testing-trouble shooting, safety tag-outs removal, and return to service).
b. Describe the controls that are in place to prevent exceeding the time limit (beyond April 30) under configurations b and c. Specifically, describe the controls (with reasonable assurance) that are in place to not start the chiller replacement too late in the winter months, factoring in all contingences, and not jeopardizing exceeding April 30.
c. Describe why it was not necessary to add a TS 3/4.7.10 SR for this time (not before November 1 and not beyond April 30), for configurations b and c.
d. Describe the actions that would be taken if April 30 is exceeded due to unplanned or unforeseen issues during chiller replacement.

**RAI-SBPB-10**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, Notes (1) and (2), that when transitioning from LCO to LCO, administrative controls are required. Specifically,

(1) When transitioning from the LCO 3.7.10b to LCO 3.7.10a configuration, the chiller may be un-isolated (restored to service) under administrative controls.

(2) The LCO 3.7.10c (Cross-Tied) configuration is common to both Units; either Unit 1 chilled water components are required operable, OR Unit 2. A combination of both Units chilled water components is not permitted. When transitioning from the LCO 3.7.10c configuration to either the LCO 3.7.10a or LCO 3.7.10b configurations, chilled water components may be restored to service under administrative controls.

NUREG-1431, Revision 4, "Standard Technical Specifications, Westinghouse Plants" (ADAMS Accession No. ML12100A228), has examples of completion times for the return to service of safety-related components. For example, B 3.4.12, "Low Temperature Overpressure Protection (LTOP) System," states, in part:

> The LCO is modified by two Notes. Note 1 allows [two charging pumps] to be made capable of injecting for ≤ 1 hour during pump swap operations. One hour provides sufficient time to safely complete the actual transfer and to complete the administrative controls and Surveillance Requirements associated with the swap.

ISSUE:

The return to service time allowance is not stated in the LAR for TS 3/4.7.10, Notes (1) and (2).

RAI:

a. Describe during this transition period if automatic chiller functions are bypassed or removed.
b. Describe the controls in place to prevent equipment damage (for example, pump run out, pump dead head, water hammer, chiller reverse flow) during transition from cross-tie open to cross-tie closed while maintaining the AB CH system operable.
c. Describe the planned duration for 'return to operable service' under administrative controls for Notes (1) and (2).
d. Describe if this planned duration (sufficient time allowed) for return to service should be added to Notes (1) and (2) in the TSs.

**RAI-SBPB-11**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration b is proposed to allow chiller replacement. PSEG stated that calculations modeled this configuration.

PSEG also stated in Section 5.2 of the LAR that the applicable regulatory requirements and criteria include GDC 46.

ISSUE:

The LAR does not describe the field testing that will take place that validates the calculation/model for TS 3/4.7.10, configuration b. Also, the LAR does not describe the testing that will take place to determine the effects of new chillers on the calculation/model.

RAI:

Describe the pre-operational field testing that will take place that validated the calculation/model for configuration b. This should include, but not limited to:

- Near the upper band of SW temperature for April conditions (highest heat sink temperature).
- One chiller operation (assuming two chiller operations with single failure of one chiller).
- ECAC isolation (SW in standby mode).
- ECAC operation with SW in service as a heat sink.
- Chiller water flow isolated for the out of service chiller.
- CREACS in single filtration train alignment.
- Non-essential heat loads isolated on both units.
- Testing of bounding combinations of old and new chillers.

**RAI-SBPB-12**

BACKGROUND:

The existing TS 3/4.7.10 ACTION allows 14 days with one inoperable chiller and 72 hours with two inoperable chillers. PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration b is proposed to allow chiller replacement.

ISSUE:

Over a period of time, all three safety-related chillers on Unit No. 1 will be replaced, and all three safety-related chillers on Unit No. 2 will be replaced.

RAI:

Describe and justify why TS 3/4.7.10 – configuration b is needed for the life of the plant once the three (per unit) chillers have been replaced.

**RAI-SBPB-13**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration b is proposed to allow chiller replacement.

ISSUE:

Over a period of time, all three AB CH chillers on Unit No. 1 will be replaced, and all three safety-AB CH chillers on Unit No. 2 will be replaced. As chillers are replaced between the two units, there will be various combinations of new and old chillers until all six AB CH chillers are installed, tested, and declared operable.

RAI:

Describe how the existing supporting calculation/model includes the various combinations of existing chillers and new chillers. This should include a discussion for the SW control valve (SW102) in maintaining condenser pressure at 210 pounds per square inch gauge and preventing freezing for the new chiller and refrigerant with R134A versus old refrigerant R22.

**RAI-SBPB-14**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration b, is proposed to allow chiller replacement, and configuration c is proposed to allow maintenance on common components. For configuration b, item 2, the unit ECAC is isolated from the chilled water system. For configuration c, item 2, the ECAC is also isolated from the chilled water system.

PSEG also stated in the LAR that removal of the ECAC from the AB CH system ensures that the heat load is within the capacity of the remaining chillers.

ISSUE:

The ECACs are normally aligned to the AB CH but may be cooled by the SW system if required for emergencies. Isolating the ECACs from AB CH will reduce the total heat load on the AB CH system and improve the flow distribution in the two chiller or cross-tied LCO configurations.

Also, the provided chilled water drawing (Figure 4-1 – Simplified AB CH System Diagram) shows the interconnection to the ECAC loads from SW as blind flanges.

Based on Salem, Unit No. 1 drawings of the SW system (205242A8761-83 Sheet 5), there appears to be a safety-classification to non-safety-classification break at the piping spool pieces.

The Salem, Unit No. 2 drawings of SW system (205342A8763-74 Sheet 5) appear to be slightly different from Unit No. 1 and do not show spool pieces.

RAI:

a. Describe how the ECAC operates during normal, abnormal, and accident conditions.
b. Describe the emergency connection types or valve numbers (or spool pieces) for both units that need to be opened from the SW to the chilled water system (provide added detailed drawings, if possible). Also, describe the safety classification and seismic category for these connections.

c. Describe the SW calculations that support this configuration and describe any negative affects to SW flow to the adjacent chiller condenser (reference UFSAR, Unit No. 2, Figures 9.2-1A and 9.2-1B).
d. Describe if this SW to AB CH configuration was previously licensed for normal, abnormal, and/or accident conditions.
e. Describe maximum allowed SW temperature for operability of the ECAC and temperature margins as compared to Table 4-4.1, "Monthly Delaware River Water Temperatures," of the LAR.
f. Describe in detail how the SW system is isolated from the balance of the AB CH system (check valves/gate valves with valve numbers).
g. Describe any additional testing (that is, Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment") that will be required for the ECAC heat exchangers, since SW will now flow during normal operation versus emergency.
h. Describe any flow and heat loading testing verification for this new configuration with SW flow to the ECAC heat exchangers.

**RAI-SBPB-15**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration b is proposed to allow chiller replacement and configuration c is proposed to allow maintenance on common components.

ISSUE:

PSEG Nuclear Calculation No. S-C-CAV-MDC-2320, "Evaluation of the Control Area Ventilation System During Chilled Water System Chiller Replacement," Revision 1, Background section states: "Cross-tie operation allows all chillers in a unit to be replaced at one time. Cross-tie operation also allows other maintenance to be performed on common line components."

PSEG Nuclear Calculation No. S-C-CAV-MDC-2320, Approach section also makes a similar statement related to cross-tie configuration for chiller replacement. In addition, PSEG Vendor Technical Document 903136(001), MPR-4027, "Salem Chilled Water System Evaluation to Support Reduction in Required Chillers," Revision 2, Background section also makes a similar statement related to cross-tie configuration for chiller replacement.

RAI:

a. Describe if the statement related to the purpose of the cross-tie regarding use of the cross-tie for chiller replacement in the noted calculations is made in error.
b. Based on the response to item 1, review all support calculations and make necessary adjustments/revisions or restate the purpose of the proposed TS 3/4.7.10, configuration c, unit cross-tie in a supplemental letter to the staff.

**RAI-SBPB-16**

BACKGROUND:

PSEG stated in the LAR, under proposed TS 3/4.7.10, that configuration b, is proposed to allow chiller replacement and configuration c is proposed to allow maintenance on common components.

ISSUE:

Based on the NRC staff's review of the AB CH system, manual valves are installed on the entrance and exit of each chiller.

For configuration b, LAR Table 4-8, "Limitations and Required Configuration for AB CH System During Two Chiller Operation," Note 1 states:

> The supporting calculations demonstrate that only one chiller is required to be operating in each unit for normal operation and accident conditions. This supports operating with two chillers available and the potential loss of a chiller during an accident as the **single failure** or the unexpected loss of a chiller during normal operation resulting in entering a TS ACTION Statement until the chiller is restored. [Emphasis added to single failure.]

For configuration c, LAR Table 4-13, "Limitations and Required Configuration for AB CH Systems Cross-Tied Operations," Note 1 states:

> The supporting calculations demonstrate that only two chillers are required to be operating for normal operation and accident conditions. This supports operating with three chillers available and the potential loss of a chiller during an accident as the **single failure** or the unexpected loss of a chiller during normal operation resulting in entering a TS LCO Action statement until the chiller is restored. [Emphasis added to single failure.]

RAI:

For proposed Configuration b:

a. Describe how AB CH flow is aligned through the operable chillers during normal operation, that is, if flow is aligned at all times.

b. Describe how AB CH flow is aligned during "two chiller" operations during normal and accident conditions. That is, describe if full flow is still aligned at all times through the two chiller.

c. Describe how AB CH flow is aligned during "two chiller" operations during normal and accident conditions and one chiller trips (due to a chiller electrical fault).

d. Describe if operator actions are required to isolated AB CH water flow through any postulated tripped chillers or is the mixing of hot water system return with any cold water

out of the running chillers accounted for in supporting calculations. Describe operator time limits, if applicable.

For proposed configuration c:

e. Describe how AB CH flow is aligned through the three operable chillers (unit cross-tie) during normal operation, that is, describe if flow is aligned at all times.

f. Describe how AB CH flow is aligned during cross-tie operations if an accident occurs on that unit, that is, describe if full flow is still aligned at all times through the three chillers.

g. Describe how AB CH flow is aligned during cross-tie operations if an accident occurs on that unit, and one chiller trips (due to a chiller electrical fault).

h. Describe if operator actions are required to isolate AB CH water flow through any postulated tripped chillers or is the mixing of hot water system return with any cold water out of the running chillers accounted for in supporting calculations. Describe operator time limits, if applicable.

**RAI-SCVB-1**

Explain why single filtration alignment is entered in proposed TS 3.7.10, configuration b. On page 10 of 35 of the LAR, it states that single filtration train mode is used when the other unit is removed from service for maintenance. Explain the purpose of this alignment in TS 3.7.10, configuration b.

**RAIs-STSB-1 and 2**

BACKGROUND:

Section 50.36 of 10 CFR 50 contains regulatory requirements for the content of TSs. LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. SRs provide assurance that an LCO is met. NUREG-0452, "Standard Technical Specifications for Westinghouse Pressurized Water Reactors," contains guidance for the format and content of licensee TSs. The Salem TSs generally follow the guidance of NUREG-0452. Sections 3.0 and 4.0 of the Salem TSs contain usage rules for LCOs and SRs. SR 4.0.1 states that SRs are required to be met at all times when in the applicability, unless otherwise stated in the SR.

The proposed format contains structure, system, or component (SSC) status/lineup requirements in the Applicability statement. Typically, information in the Applicability statement is restricted to the MODE of the plant or status of fuel movement. SSC status/lineup requirement information is generally placed in the ACTION section of the TSs for conditions when the LCO is not met.

The proposed TSs rely on a three-configuration applicability statement that requires the use of copious footnotes that provide caveats and extra information to operators and inspectors regarding configuration-specific requirements.

The proposed format does not appear to provide sufficient clarity to operators or inspectors as to whether or not SRs apply and when they would be required to be met. This lack of clarity could lead to confusion regarding whether or not the LCO is met. Therefore, the TSs may not meet the requirements of 10 CFR 50.36, generally, or 10 CFR 50.36(c)(3) (SRs), specifically.

RAI-1

Please provide a discussion which justifies the proposed TSs with respect to the regulatory requirements of 10 CFR 50.36, generally, and 10 CFR 50.36(c)(3) (SRs), specifically.

RAI-2

Given the usage rules and typical format for the current Salem TSs, please provide a justification for the proposed format and discuss how the proposed format aligns with and conforms to the current usage rules and format of other Salem TSs. Alternatively, provide a new proposed format for the chilled water system TS changes that more closely align with the rest of the Salem TSs and NUREG-0452.

February 17, 2016

Mr. Robert Braun
President and Chief Nuclear Officer
PSEG Nuclear LLC - N09
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING CHILLED WATER SYSTEM MODIFICATIONS (CAC NOS. MF6724 AND MF6725)

Dear Mr. Braun:

By letter dated September 11, 2015 (Agencywide Documents Access and Management System Accession No. ML15254A387), as supplemented by letter dated November 5, 2015 (ADAMS Accession No. ML15309A750), PSEG Nuclear LLC (PSEG, the licensee) submitted a license amendment request for Salem Nuclear Generating Station, Unit Nos. 1 and 2. The proposed amendment would revise the technical specifications to support planned plant modifications to implement chiller replacements and for performing maintenance on common line components.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's application and, based upon this review, determined that additional information is needed, as set forth in the enclosed Request for Additional Information (RAI). On January 11, 2016, and January 27, 2016, a draft of these questions was sent to Mr. Paul Duke of your staff to ensure that the questions were understandable, the regulatory basis for the questions was clear, there is no proprietary information contained in the RAI, and to determine if the information was previously docketed. On February 4, 2016, Mr. Brian Thomas of your staff indicated that PSEG will submit a response by March 31, 2016.

If you have any questions, please contact me at 301-415-1603 or Carleen.Parker@nrc.gov.

Sincerely,
***/RA/***
Carleen J. Parker, 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/enclosure: Distribution via Listserv

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**ADAMS Accession No.: ML16013A159** *by memo

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|---|---|---|---|---|
| NAME | CParker | LRonewicz | RElliott | GCasto |
| DATE | 2/17/2016 | 2/1/2016 | 1/26/2016 | 12/21/2015 |

| OFFICE | NRR/DSS/SCVB/BC | NRR/DORL/LPL1-2/BC | NRR/DORL/LPL1-2/PM |
|---|---|---|---|
| NAME | RDenning | DBroaddus | CParker |
| DATE | 1/11/2016 | 2/17/2016 | 2/17/2016 |

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