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

November 2, 2016

Mr. Peter P. Sena, III
President
PSEG Nuclear LLC - N09
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENTS RE: CHILLED WATER SYSTEM MODIFICATION (CAC NOS. MF6724 AND MF6725)

Dear Mr. Sena:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 316 and 297 to Renewed Facility Operating License Nos. DPR-70 and DPR-75 for Salem Nuclear Generating Station, Unit Nos. 1 and 2, respectively. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated September 11, 2015, as supplemented by letters dated November 5, 2015; March 31, 2016; August 12, 2016; and August 30, 2016.

The amendments revise the TSs to support planned plant modifications to implement chiller replacements, for performing maintenance, and for unplanned operational issues.

A copy of our Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

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

Enclosures:
1. Amendment No. 316 to Renewed DPR-70
2. Amendment No. 297 to Renewed DPR-75
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv

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

PSEG NUCLEAR LLC

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-272

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 316
Renewed License No. DPR-70

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by PSEG Nuclear LLC, acting on behalf of itself and Exelon Generation Company, LLC (the licensees), dated September 11, 2015, as supplemented by letters dated November 5, 2015; March 31, 2016; August 12, 2016; and August 30, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

Enclosure 1

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraphs 2.C.(2) and 2.C.(22) of Renewed Facility Operating License No. DPR-70 are hereby amended to read as follows:

    (2) Technical Specifications and Environmental Protection Plan

    The Technical Specifications contained in Appendix A, as revised through Amendment No. 316, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications, and the Environmental Protection Plan.

    (22) Concurrent with the first use of the chilled water cross-tie as allowed by Technical Specification 3.7.10c, PSEG shall confirm the required performance of the chilled water system cross-tie.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Douglas A. Broaddus for

Stephen Koenick, Acting Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility Operating
License and Technical Specifications

Date of Issuance: November 2, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 316

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

RENEWED FACILITY OPERATING LICENSE NO. DPR-70

DOCKET NO. 50-272

Replace the following pages of Renewed Facility Operating License No. DPR-70 with the attached revised pages as indicated. The revised pages are identified by amendment number and contain a marginal line indicating the area of change.

Remove	Insert
3	3
7	7
8	8
9	9

Replace the following pages of the Appendix A, Technical Specifications, with the attached revised pages as indicated. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3/4 7-18	3/4 7-18
3/4 7-19	3/4 7-19
3/4 7-33	3/4 7-33
-------	3/4 7-33a
-------	3/4 7-33b
3/4 7-34	3/4 7-34

instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;

(5) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30 and 70, to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

PSEG Nuclear LLC is authorized to operate the facility at a steady state reactor core power level not in excess of 3459 megawatts (one hundred percent of rated core power).

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 316, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications, and the Environmental Protection Plan.

(3) Deleted Per Amendment 22, 11-20-79

(4) Less than Four Loop Operation

PSEG Nuclear LLC shall not operate the reactor at power levels above P-7 (as defined in Table 3.3-1 of Specification 3.3.1.1 of Appendix A to this renewed license) with less than four (4) reactor coolant loops in operation until safety analyses for less than four loop operation have been submitted by the licensees and approval for less than four loop operation at power levels above P-7 has been granted by the Commission by Amendment of this renewed license.

(5) PSEG Nuclear LLC shall implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety

indexes or other non-nuclear sector mutual funds, investments in any entity owning one or more nuclear power plants are prohibited.

(c) The decommissioning trust agreement for Salem, Unit 1, must provide that no disbursements or payments from the trust shall be made by the trustee unless the trustee has first given the Director of the Office of Nuclear Reactor Regulation 30 days prior written notice of payment. The decommissioning trust agreement shall further contain a provision that no disbursements or payments from the trust shall be made if the trustee receives prior written notice of objection from the NRC.

(d) The decommissioning trust agreement must provide that the agreement can not be amended in any material respect without 30 days prior written notification to the Director of the Office of Nuclear Reactor Regulation.

(e) The appropriate section of the decommissioning trust agreement shall state that the trustee, investment advisor, or anyone else directing the investments made in the trust shall adhere to a "prudent investor" standard, as specified in 18 CFR 35.32(a)(3) of the Federal Energy Regulatory Commission's regulations.

(15) Exelon Generation Company shall take all necessary steps to ensure that the decommissioning trust is maintained in accordance with the application for approval of the transfer of the Salem, Unit 1, license to it and the requirements of the Order approving the transfer, and consistent with the safety evaluation supporting the Order.

(16) <u>Mitigation Strategy</u>

The licensee shall develop and maintain strategies for addressing large fires and explosions and that include the following key areas:

(a) Fire fighting response strategy with the following elements:

1. Pre-defined coordinated fire response strategy and guidance
2. Assessment of mutual aid fire fighting assets
3. Designated staging areas for equipment and materials
4. Command and control
5. Training of response personnel

(b) Operations to mitigate fuel damage considering the following:

1. Protection and use of personnel assets
2. Communications
3. Minimizing fire spread
4. Procedures for implementing integrated fire response strategy
5. Identification of readily-available pre-staged equipment
6. Training on integrated fire response strategy
7. Spent fuel pool mitigation measures

(c) Actions to minimize release to include consideration of:

1. Water spray scrubbing
2. Dose to onsite responders

(17) Upon implementation of Amendment No. 286 adopting TSTF-448, Revision 3, the determination of control room envelope (CRE) unfiltered air inleakage as required by SR 4.7.6.2, in accordance with TS 6.18.c.(i), the assessment of CRE habitability as required by Specification 6.18.c.(ii). and the measurement of CRE pressure as required by Specification 6.18.d, shall be considered met. Following implementation:

a. The first performance of SR 4.7.6.2. in accordance with Specification 6.18.c.(i), shall be within the specified frequency of 6 years, plus the 18 month allowance of SR 4.0.2, as measured from June 4, 2003, the date of the most recent successful tracer gas test, as stated in the December 9, 2003 letter response to Generic Letter 2003-01, or within the next 18 months if the time period since the most recent successful tracer gas test is greater than 6 years.

b. The first performance of the periodic assessment of CRE habitability, Specification 6.18.c.(ii), shall be 3 years, plus the 9 month allowance of SR 4.0.2, as measured from June 4, 2003, the date of the most recent successful tracer gas test, as stated in the December 9, 2003 letter response to Generic Letter 2003-01, or within the next 9 months if the time period since the most recent successful tracer gas test is greater than 3 years.

c. The first performance of the periodic measurement of CRE pressure, Specification 6.18.d, shall be within 18 months, plus the 138 days allowed by SR 4.0.2, as measured from September 22, 2005, the date of the most recent successful pressure measurement test, or within 138 days if not performed previously.

(18) PSEG Nuclear LLC may make changes to the programs and activities described in the UFSAR supplement, submitted pursuant to 10 CFR 54.21(d), as revised during the license renewal application review process, provided PSEG Nuclear LLC evaluates such changes pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

(19) Appendix A of NUREG-2101, "Safety Evaluation Report Related to the License Renewal of Salem Nuclear Generating Station," dated June 2011, and PSEG Nuclear LLC UFSAR supplement submitted pursuant to 10 CFR 54.21(d), as revised on May 18, 2011, describe certain future programs and activities to be completed before the period of extended operation. PSEG Nuclear LLC shall complete these activities no later than August 13, 2016, and shall notify the NRC in writing when implementation of these activities is complete.

(20) All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of American Society for Testing and Materials (ASTM) E 185-82 to the extent practicable for the configuration of the

specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC. Changes to the withdrawal schedule or storage requirements shall be submitted to the NRC as a report in accordance with 10 CFR 50.4.

(21) PSEG Nuclear LLC shall take one core sample in the Unit 1 spent fuel pool west wall, by the end of 2013, and one core sample in the east wall where there have been indications of borated water ingress through the concrete, by the end of 2015. The core samples (east and west walls) will expose the rebar, which will be examined for signs of corrosion. Any sample showing signs of concrete degradation and/or rebar corrosion will be entered into the licensee's corrective action program for further evaluation. PSEG Nuclear LLC shall submit a report in accordance with 10 CFR 50.4 no later than three months after each sample is taken on the results, recommendations, and any additional planned actions.

(22) Concurrent with the first use of the chilled water cross-tie as allowed by Technical Specification 3.7.10c, PSEG shall confirm the required performance of the chilled water system cross-tie.

D. Paragraph 2.D. has been combined with paragraph 2.E. per Amendment No. 86, June 27, 1988.

E. The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The plans, submitted by letter dated May 19, 2006, are entitled: "Salem-Hope Creek Nuclear Generating Station Security Plan," "Salem-Hope Creek Nuclear Generating Station Security Training and Qualification Plan," and "Salem-Hope Creek Nuclear Generating Station Security Contingency Plan." The plans contain Safeguards Information protected under 10 CFR 73.21.

PSEG Nuclear LLC shall fully implement and maintain in effect all provisions of the Commission-approved Cyber Security Plan (CSP), including changes made pursuant to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The Salem-Hope Creek CSP was approved by License Amendment No. 300 as supplemented by changes approved by License Amendment Nos. 302 and 306.

3/4.7.6 CONTROL ROOM EMERGENCY AIR CONDITIONING SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.6.1 The common control room emergency air conditioning system (CREACS)* shall be OPERABLE with:

a. Two independent air conditioning filtration trains (one from each unit) consisting of:

1. Two fans and associated outlet dampers,
2. One cooling coil,
3. One charcoal adsorber and HEPA filter array,
4. Return air isolation damper.

b. All other automatic dampers required for operation in the pressurization or recirculation modes.

c. The control room envelope intact.

NOTE: The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: ALL MODES and during movement of irradiated fuel assemblies.

ACTION: MODES 1, 2, 3, and 4

a. With one filtration train inoperable, align CREACS for single filtration train operation** within 4 hours, and restore the inoperable filtration train to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With CREACS aligned for single filtration train operation and with one of the two remaining fans or associated outlet damper inoperable, restore the inoperable fan or damper to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the Control Room Envelope boundary inoperable:

1. Immediately, initiate action to implement mitigating actions, and

2. Within 24 hours, verify mitigating actions ensure CRE occupant exposures to radiological, chemical, and smoke hazards will not exceed limits, and

3. Within 90 days, restore the Control Room Envelope boundary to OPERABLE status, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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* The CREACS is a shared system with Salem Unit 2

** Alignment only permitted if the Unit with the operable CREACS train is also in Chilled Water System LCO 3.7.10a configuration. Alignment is not permitted if in the LCO 3.7.10c configuration.

LIMITING CONDITION FOR OPERATION (Continued)

d. With one or both series isolation damper(s) on a normal Control Area Air Conditioning System (CAACS) outside air intake or exhaust duct inoperable, close the affected duct within 4 hours by use of at least one isolation damper secured in the closed position or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. (Refer to ACTION 25 of Table 3.3-6.)

e. With one or both isolation damper(s) on an outside emergency air conditioning air intake duct inoperable, close the affected duct within 4 hours by use of at least one isolation damper secured in the closed position and restore the damper(s) to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

MODES 5 and 6 or during movement of irradiated fuel assemblies

a. With one filtration train inoperable, align CREACS for single filtration train operation** within 4 hours, or suspend movement of irradiated fuel assemblies.

b. With CREACS aligned for single filtration train operation with one of the two remaining fans or associated outlet damper inoperable, restore the fan or damper to OPERABLE status within 72 hours, or suspend movement of irradiated fuel assemblies.

c. With two filtration trains inoperable, immediately suspend movement of irradiated fuel assemblies.

d. With the Control Room Envelope boundary inoperable, immediately suspend movement of irradiated fuel assemblies.

e. With one or both series isolation damper(s) on a normal CAACS outside air intake or exhaust duct inoperable, immediately suspend movement of irradiated fuel assemblies until the affected duct is closed by use of at least one isolation damper secured in the closed position. (Refer to ACTION 25 of Table 3.3-6.)

f. With one or both series isolation damper(s) on an outside emergency air conditioning air intake duct inoperable, immediately suspend movement of irradiated fuel assemblies until the affected duct is closed by use of at least one isolation damper secured in the closed position. To resume movement of irradiated fuel assemblies, at least one emergency air intake duct must be operable on each unit.

3/4.7.10 CHILLED WATER SYSTEM - AUXILIARY BUILDING SUBSYSTEM

LIMITING CONDITION FOR OPERATION

3.7.10 The chilled water system loop which services the safety-related loads in the Auxiliary Building shall be OPERABLE with one of the following configurations:

	a	b	c
Configuration	1. Three OPERABLE chillers and, 2. Two OPERABLE chilled water pumps	1. Two OPERABLE chillers and, 2. Two OPERABLE chilled water pumps	1. Three OPERABLE chillers and, 2. Two OPERABLE chilled water pumps from either Unit 1 or Unit 2 (Units Cross-tied)[(2)]
APPLICABILITY	1. ALL MODES and during movement of irradiated fuel assemblies	1. From November 1 through April 30 in ALL MODES and during movement of irradiated fuel assemblies# 2. The Unit 1 Emergency Control Air Compressor (ECAC) is isolated from the chilled water system 3. Chilled water flow to the third chiller that is not in service is isolated[(1)] 4. Control Room Emergency Air Conditioning System (CREACS) alignment a. BOTH CREACS trains OPERABLE, no additional chilled water heat load removal required, OR b. Single CREACS train OPERABLE (TS 3.7.6.1 ACTION a.) the following restrictions apply: i. Alignment only permitted to Unit 2 ii. Unit 2 must be in the LCO 3.7.10a configuration iii. Non-essential heat loads are isolated from the chilled water system on BOTH Units	1. From November 1 through April 30 in ALL MODES and during movement of irradiated fuel assemblies## 2. The Unit 1 and Unit 2 ECACs are isolated from the chilled water system 3. Non-Essential heat loads are isolated from the chilled water system on BOTH Units 4. BOTH CREACS trains are operable per TS 3.7.6.1 (single filtration train alignment is not permitted) 5. Unit chilled water cross-tie valves are OPEN 6. Administrative controls are in place for the Unit providing the required components to notify the other Unit if a chiller or pump becomes inoperable

\# The LCO 3.7.10b configuration may only be used for periods of 60 contiguous days. The 60-contiguous days does not apply for LCO 3.7.10b entry to support the replacement of all 6 original chillers (Units 1 and 2).

\## The LCO 3.7.10c configuration may only be used for periods of 45 contiguous days.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION[3]: MODES 1, 2, 3, and 4

a. With one of the required chillers inoperable:

1. Remove[4] the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Restore the chiller to OPERABLE status within 14 days or;

3. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two of the required chillers inoperable[5][6]:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Align the control room emergency air conditioning system (CREACs) for single filtration operation using the Salem Unit 2 train within 4 hours and;

3. Restore at least one chiller to OPERABLE status within 72 hours or;

4. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ACTION[3]: MODES 5 and 6 or during movement of irradiated fuel assemblies. *

a. With one of the required chillers inoperable:

1. Remove[4] the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Restore the chiller to OPERABLE status within 14 days or;

3. Suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

LIMITING CONDITION FOR OPERATION (Continued)

b. With two of the required chillers inoperable[(5)(6)]:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Align the control room emergency air conditioning system (CREACs) for single filtration operation using the Salem Unit 2 train within 4 hours and;

3. Restore at least one chiller to OPERABLE status within 72 hours or;

4. Suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

SURVEILLANCE REQUIREMENTS

4.7.10 The chilled water loop which services the safety-related loads in the Auxiliary Building shall be demonstrated OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by verifying that each manual valve in the chilled water system flow path servicing safety related components that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. In accordance with the Surveillance Frequency Control Program, by verifying that each automatic valve actuates to its correct position on a Safeguards Initiation signal.

c. In accordance with the Surveillance Frequency Control Program by verifying that each chiller starts and runs.

d. When in the LCO 3.7.10b configuration verify once per 24 hours:

(i) The Unit 1 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.

SURVEILLANCE REQUIREMENTS (Continued)

NOTES

(1) When transitioning from the LCO 3.7.10b to the 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

(3) When in the LCO 3.7.10c configuration ACTIONs are applicable for both Units

(4) When in the LCO 3.7.10c configuration this ACTION has already been implemented

(5) When in the LCO 3.7.10b configuration, implement Action b.2 AND Action b.4 OR transition to the LCO 3.7.10c configuration

(6) When in LCO 3.7.10c configuration, proceed directly to Action b.4

* During Modes 5 and 6 and during movement of irradiated fuel assemblies, chilled water components are not considered to be inoperable solely on the basis that the backup emergency power source, diesel generator, is inoperable. This is not applicable to the LCO 3.7.10c configuration.

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

PSEG NUCLEAR LLC

EXELON GENERATION COMPANY, LLC

DOCKET NO. 50-311

SALEM NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 297
Renewed License No. DPR-75

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by PSEG Nuclear LLC, acting on behalf of itself and Exelon Generation Company, LLC (the licensees), dated September 11, 2015, as supplemented by letters dated November 5, 2015; March 31, 2016; August 12, 2016; and August 30, 2016, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in Title 10 of the *Code of Federal Regulations* (10 CFR), Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraphs 2.C.(2) and 2.C.(37) of Renewed Facility Operating License No. DPR-75 are hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 297, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(37) Concurrent with the first use of the chilled water cross-tie as allowed by Technical Specification 3.7.10c, PSEG shall confirm the required performance of the chilled water system cross-tie.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Doug A Bell for

Stephen Koenick, Acting Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility Operating License and Technical Specifications

Date of Issuance: November 2, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 297

SALEM NUCLEAR GENERATING STATION, UNIT NO. 2

RENEWED FACILITY OPERATING LICENSE NO. DPR-75

DOCKET NO. 50-311

Replace the following pages of Renewed Facility Operating License No. DPR-75 with the attached revised pages as indicated. The revised pages are identified by amendment number and contain a marginal line indicating the area of change.

Remove	Insert
3	3
9	9
10	10

Replace the following pages of the Appendix A, Technical Specifications, with the attached revised pages as indicated. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3/4 7-15	3/4 7-15
3/4 7-16	3/4 7-16
3/4 7-28	3/4 7-28
--------	3/4 7-28a
--------	3/4 7-28b
3/4 7-29	3/4 7-29

(4) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use at any time any byproduct, source or special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration and as fission detectors in amounts as required;

(5) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and

(6) PSEG Nuclear LLC, pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility.

C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) <u>Maximum Power Level</u>

PSEG Nuclear LLC is authorized to operate the facility at steady state reactor core power levels not in excess of 3459 megawatts (thermal).

(2) <u>Technical Specifications and Environmental Protection Plan</u>

The Technical Specifications contained in Appendix A, as revised through Amendment No. 297, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. PSEG Nuclear LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(31) Exelon Generation Company shall take all necessary steps to ensure that the decommissioning trust is maintained in accordance with the application for approval of the transfer of its ownership interest in Salem, Unit 2, license and the requirements of the Order approving the transfer, and consistent with the safety evaluation supporting the Order.

(32) Mitigation Strategy

The licensee shall develop and maintain strategies for addressing large fires and explosions and that include the following key areas:

a. Fire fighting response strategy with the following elements:

1. Pre-defined coordinated fire response strategy and guidance
2. Assessment of mutual aid fire fighting assets
3. Designated staging areas for equipment and materials
4. Command and control
5. Training of response personnel

b. Operations to mitigate fuel damage considering the following:

1. Protection and use of personnel assets
2. Communications
3. Minimizing fire spread
4. Procedures for implementing integrated fire response strategy
5. Identification of readily-available pre-staged equipment
6. Training on integrated fire response strategy
7. Spent fuel pool mitigation measures

c. Actions to minimize release to include consideration of:

1. Water spray scrubbing
2. Dose to onsite responders

(33) Upon implementation of Amendment No. 269 adopting TSTF-448, Revision 3, the determination of control room envelope (CRE) unfiltered air inleakage as required by SR 4.7.6.2, in accordance with TS 6.17.c.(i), the assessment of CRE habitability as required by Specification 6.17.c. (ii), and the measurement of CRE pressure as required by Specification 6.17.d, shall be considered met. Following implementation:

a. The first performance of SR 4.7.6.2, in accordance with Specification 6.17.c.(i), shall be within the specified frequency of 6 years, plus the 18 month allowance of SR 4.0.2, as measured from June 4, 2003, the date of the most recent successful tracer gas test, as stated in the December 9, 2003 letter response to Generic Letter 2003-01, or within the next 18 months if the time period since the most recent successful tracer gas test is greater than 6 years.

b. The first performance of the periodic assessment of CRE habitability, Specification 6.17.c(ii), shall be 3 years, plus the 9 month allowance of SR 4.0.2, as measured from June 4, 2003, the date of the most recent successful tracer gas test, as stated in the December 9, 2003 letter response to Generic Letter 2003-01, or within the next 9 months if the time period since the most recent successful tracer gas test is greater than 3 years.

c. The first performance of the periodic measurement of CRE pressure, Specification 6.17.d, shall be within 18 months, plus the 138 days allowed by SR 4.0.2, as measured from September 22, 2005, the date of the most recent successful pressure measurement test, or within 138 days if not performed previously.

(34) PSEG Nuclear LLC may make changes to the programs and activities described in the UFSAR supplement, submitted pursuant to 10 CFR 54.21(d), as revised during the license renewal application review process, provided PSEG Nuclear LLC evaluates such changes pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

(35) Appendix A of NUREG-2101, "Safety Evaluation Report Related to the License Renewal of Salem Nuclear Generating Station," dated June 2011, and PSEG Nuclear LLC UFSAR supplement submitted pursuant to 10 CFR 54.21(d), as revised on May 18, 2011, describe certain future programs and activities to be completed before the period of extended operation. PSEG Nuclear LLC shall complete these activities no later than April 18, 2020, and shall notify the NRC in writing when implementation of these activities is complete.

(36) All capsules in the reactor vessel that are removed and tested must meet the test procedures and reporting requirements of American Society for Testing and Materials (ASTM) E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the NRC prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the NRC. Changes to the withdrawal schedule or storage requirements shall be submitted to the NRC as a report in accordance with 10 CFR 50.4.

(37) Concurrent with the first use of the chilled water cross-tie as allowed by Technical Specification 3.7.10c, PSEG shall confirm the required performance of the chilled water system cross-tie.

D. An exemption from certain requirements of Appendix J to 10 CFR Part 50 is described in the Office of Nuclear Reactor Regulation's Safety Evaluation Report, Supplement No. 4. This exemption was authorized by law and will not endanger life of property or the common defense and security and is otherwise in the public interest. The exemption, therefore, remains in effect. The granting of the exemption was authorized with the

3/4.7.6 CONTROL ROOM EMERGENCY AIR CONDITIONING SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.6 The common control room emergency air conditioning system (CREACS)* shall be OPERABLE with:

a. Two independent air conditioning filtration trains (one from each unit) consisting of:

1. Two fans and associated outlet dampers,
2. One cooling coil,
3. One charcoal adsorber and HEPA filter array,
4. Return air isolation damper.

b. All other automatic dampers required for operation in the pressurization or recirculation modes.

c. The control room envelope intact.

NOTE: The control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: ALL MODES and during movement of irradiated fuel assemblies.

ACTION: MODES 1, 2, 3, and 4

a. With one filtration train inoperable, align CREACS for single filtration train operation** within 4 hours, and restore the inoperable filtration train to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With CREACS aligned for single filtration train operation and with one of the two remaining fans or associated outlet damper inoperable, restore the inoperable fan or damper to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the Control Room Envelope boundary inoperable:

1. Immediately, initiate action to implement mitigating actions, and

2. Within 24 hours, verify mitigating actions ensure CRE occupant exposures to radiological, chemical, and smoke hazards will not exceed limits, and

3. Within 90 days, restore the Control Room Envelope boundary to OPERABLE status, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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* The CREACS is a shared system with Salem Unit 1

** Alignment only permitted if the Unit with the operable CREACS train is also in Chilled Water System LCO 3.7.10a configuration. Alignment is not permitted if in the LCO 3.7.10c configuration.

LIMITING CONDITION FOR OPERATION (Continued)

d. With one or both series isolation damper(s) on a normal Control Area Air Conditioning System (CAACS) outside air intake or exhaust duct inoperable, close the affected duct within 4 hours by use of at least one isolation damper secured in the closed position or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. (Refer to ACTION 28 of Table 3.3-6.)

e. With one or both isolation damper(s) on an outside emergency air conditioning air intake duct inoperable, close the affected duct within 4 hours by use of at least one isolation damper secured in the closed position and restore the damper(s) to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

MODES 5 and 6 or during movement of irradiated fuel assemblies

a. With one filtration train inoperable, align CREACS for single filtration train operation** within 4 hours, or suspend movement of irradiated fuel assemblies.

b. With CREACS aligned for single filtration train operation with one of the two remaining fans or associated outlet damper inoperable, restore the fan or damper to OPERABLE status within 72 hours, or suspend movement of irradiated fuel assemblies.

c. With two filtration trains inoperable, immediately suspend movement of irradiated fuel assemblies.

d. With the Control Room Envelope boundary inoperable, immediately suspend movement of irradiated fuel assemblies.

e. With one or both series isolation damper(s) on a normal CAACS outside air intake or exhaust duct inoperable, immediately suspend movement of irradiated fuel assemblies until the affected duct is closed by use of at least one isolation damper secured in the closed position. (Refer to ACTION 28 of Table 3.3-6.)

f. With one or both series isolation damper(s) on an outside emergency air conditioning air intake duct inoperable, immediately suspend movement of irradiated fuel assemblies until the affected duct is closed by use of at least one isolation damper secured in the closed position. To resume movement of irradiated fuel assemblies, at least one emergency air intake duct must be operable on each unit.

PLANT SYSTEMS

3/4.7.10 CHILLED WATER SYSTEM - AUXILIARY BUILDING SUBSYSTEM

LIMITING CONDITION FOR OPERATION

3.7.10 The chilled water system loop which services the safety-related loads in the Auxiliary Building shall be OPERABLE with one of the following configurations:

	a	b	c
Configuration	1. Three OPERABLE chillers and, 2. Two OPERABLE chilled water pumps	1. Two OPERABLE chillers and, 2. Two OPERABLE chilled water pumps	1. Three OPERABLE chillers and, 2. Two OPERABLE chilled water pumps from either Unit 1 or Unit 2 (Units Cross-tied)(2)
APPLICABILITY	1. ALL MODES and during movement of irradiated fuel assemblies	1. From November 1 through April 30 in ALL MODES and during movement of irradiated fuel assemblies# 2. The Unit 2 Emergency Control Air Compressor (ECAC) is isolated from the chilled water system 3. Chilled water flow to the third chiller that is not in service is isolated(1) 4. Control Room Emergency Air Conditioning System (CREACS) alignment a. BOTH CREACS trains OPERABLE, no additional chilled water heat load removal required, OR b. Single CREACS train OPERABLE (TS 3.7.6 ACTION a.) the following restrictions apply: i. Alignment only permitted to Unit 1 ii. Unit 1 must be in the LCO 3.7.10a configuration iii. Non-essential heat loads are isolated from the chilled water system on BOTH Units	1. From November 1 through April 30 in ALL MODES and during movement of irradiated fuel assemblies## 2. The Unit 1 and Unit 2 ECACs are isolated from the chilled water system 3. Non-Essential heat loads are isolated from the chilled water system on BOTH Units 4. BOTH CREACS trains are operable per TS 3.7.6 (single filtration train alignment is not permitted) 5. Unit chilled water cross-tie valves are OPEN 6. Administrative controls are in place for the Unit providing the required components to notify the other Unit if a chiller or pump becomes inoperable

\# The LCO 3.7.10b configuration may only be used for periods of 60 contiguous days. The 60-contiguous days does not apply for LCO 3.7.10b entry to support the replacement of all 6 original chillers (Units 1 and 2).

\## The LCO 3.7.10c configuration may only be used for periods of 45 contiguous days.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION[3]: MODES 1, 2, 3, and 4

a. With one of the required chillers inoperable:

   1. Remove[4] the appropriate non-essential heat loads from the chilled water system within 4 hours and;

   2. Restore the chiller to OPERABLE status within 14 days or;

   3. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two of the required chillers inoperable[5][6]:

   1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

   2. Align the control room emergency air conditioning system (CREACs) for single filtration operation using the Salem Unit 1 train within 4 hours and;

   3. Restore at least one chiller to OPERABLE status within 72 hours or;

   4. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours

ACTION[3]: MODES 5 and 6 or during movement of irradiated fuel assemblies.*

a. With one of the required chillers inoperable:

   1. Remove[4] the appropriate non-essential heat loads from the Chilled Water System within 4 hours and;

   2. Restore the chiller to OPERABLE status within 14 days or;

   3. Suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

LIMITING CONDITION FOR OPERATION (Continued)

b. With two of the required chillers inoperable[(5)(6)]:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Align the control room emergency air conditioning system (CREACs) for single filtration operation using the Salem Unit 1 train within 4 hours and;

3. Restore at least one chiller to OPERABLE status within 72 hours or;

4. Suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

SURVEILLANCE REQUIREMENTS

4.7.10 The chilled water loop which services the safety-related loads in the Auxiliary Building shall be demonstrated OPERABLE:

a. In accordance with the Surveillance Frequency Control Program by verifying that each manual valve in the chilled water system flow path servicing safety related components that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. In accordance with the Surveillance Frequency Control Program, by verifying that each automatic valve actuates to its correct position on a Safeguards Initiation signal.

c. In accordance with the Surveillance Frequency Control Program by verifying that each chillers starts and runs.

d. When in the LCO 3.7.10b configuration verify once per 24 hours:

(i) The Unit 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.

Surveillance Requirements (Continued)

NOTES

(1) When transitioning from the LCO 3.7.10b to the 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

(3) When in the LCO 3.7.10c configuration ACTIONs are applicable for both Units

(4) When in the LCO 3.7.10c configuration this ACTION has already been implemented

(5) When in the LCO 3.7.10b configuration, implement Action b.2 AND Action b.4 OR transition to the LCO 3.7.10c configuration

(6) When in LCO 3.7.10c configuration, proceed directly to Action b.4

* During Modes 5 and 6 and during movement of irradiated fuel assemblies, chilled water components are not considered to be inoperable solely on the basis that the backup emergency power source, diesel generator, is inoperable. This is not applicable to the LCO 3.7.10c configuration.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NOS. 316 AND 297 TO

RENEWED FACILITY OPERATING LICENSE NOS. DPR-70 AND DPR-75

PSEG NUCLEAR LLC

EXELON GENERATION COMPANY, LLC

SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-272 AND 50-311

1.0 INTRODUCTION

By letter dated September 11, 2015,[1] as supplemented by letters dated November 5, 2015; March 31, 2016; August 12, 2016; and August 30, 2016,[2] PSEG Nuclear LLC (PSEG or the licensee) submitted a request for changes to the Salem Nuclear Generating Station (Salem), Unit Nos. 1 and 2, Technical Specifications (TSs). The requested changes would revise the TSs to support planned plant modifications to implement chiller replacements, for performing maintenance, and for unplanned operational issues.

Specifically, the license amendment request (LAR) proposes to add two limiting condition for operation (LCO) configurations and two surveillance requirements (SRs) to TS 3/4.7.10, "Chilled Water System - Auxiliary Building Subsystem." In addition, the LAR requests a change to TS 3/4.7.6, "Control Room Emergency Air Conditioning System," to add a note limiting single control room emergency air conditioning system train alignment during the two new proposed LCO 3.7.10 configurations.

By letter dated November 5, 2015, PSEG stated that the actual replacement of the chillers will be performed under the regulatory requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59, "Changes, tests, and experiments," and is not in the scope of the LAR. PSEG further stated that the LAR is based on the current Auxiliary Building chilled water (AB CH) system and that the overall function of the AB CH system is not altered by the replacement of the chillers because the replacement chillers will meet or exceed the current chiller design requirements.

[1] Agencywide Documents Access and Management System (ADAMS) Accession No. ML15254A387
[2] ADAMS Accession Nos. ML15309A750, ML16091A237, ML16225A436, and ML16243A227, respectively

The supplements dated March 31, 2016; August 12, 2016; and August 30, 2016, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC or the Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on January 5, 2016 (81 FR 263).

2.0 REGULATORY EVALUATION

The NRC staff reviewed the proposed TS changes against the regulatory requirements and guidance listed below to ensure that there is reasonable assurance that the systems and components affected by the proposed TS changes will perform their safety functions.

2.1 Regulatory Requirements

The NRC staff identified the following regulatory requirements as applicable to the proposed amendments.

2.1.1 General Design Criteria

Salem was designed in accordance with the Atomic Industrial Forum (AIF) General Design Criteria and the licensee's understanding of the intent of the Atomic Energy Commission (AEC)-proposed General Design Criteria published in 1967. The licensee performed a comparison of the Salem, Unit Nos. 1 and 2, plant design and 10 CFR Part 50, Appendix A, "General Design Criteria for Nuclear Power Plants" (GDC), dated July 7, 1971. This comparison was documented in the Salem Updated Final Safety Analysis Report (UFSAR), Section 3.1.3, which concludes, in part, that the Salem plant design conforms with the intent of the GDC, with the exception of Criterion 4, "Environmental and Dynamic Effects Design Bases;" Criterion 55, "Reactor Coolant Pressure Boundary Penetrating Containment;" Criterion 56, "Primary Containment Isolation;" and Criterion 57, "Closed System Isolation Valves."

In Section 5.2, "Applicable Regulatory Requirements and Criteria," of Attachment 1 to the September 11, 2015, LAR, PSEG listed several regulatory requirements and criteria as applicable to the LAR. The NRC staff identified the following applicable requirements.

- GDC 5, "Sharing of structures, systems, and components"

  Structures, systems, and components important to safety shall not be shared among nuclear power units unless it can be shown that such sharing will not significantly impair their ability to perform their safety functions, including, in the event of an accident in one unit, an orderly shutdown and cooldown of the remaining units.

The cross-tied configuration, allows one unit to provide the chillers and chilled water pumps for both units. The unit cross-tie for the AB CH system does not impact the plant, given a complete loss of chilled water equipment for one unit, with the prescribed conditions and alignment as stated in proposed LCO 3.7.10c. The unit sharing will not significantly impair the ability of the AB CH system to perform its safety functions, including, in the event of an accident in one unit, an

orderly shutdown and cooldown of the other unit. Therefore, as more fully explained below, the NRC staff finds that the requirements of GDC 5 are met.

- GDC 46, "Testing of cooling water system"

  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.

PSEG stated that flow measurements will be taken during the proposed new LCO configurations with the existing chillers and with the replacement chillers. PSEG has stated that the replacement of the chillers will be performed under 10 CFR 50.59. As part of that process, PSEG will ensure compliance with all regulatory requirements.

There are no physical changes to the current AB CH system requested in this LAR. The proposed changes will require certain heat loads to be isolated (or opened), depending on entering or exiting the proposed new operating configurations. Therefore, as more fully explained below, the NRC staff concludes that the proposed changes do not alter conformance with either the 10 CFR 50, Appendix A, GDC, or the AIF GDC as listed in the Salem UFSAR, Sections 3.1.2 and 3.1.3.

2.1.2 Applicable TS Regulations

The Commission's regulatory requirements related to the content of the TSs are set forth in 10 CFR 50.36, "Technical specifications." This regulation requires that the TSs include items in the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) SRs; (4) design features; and (5) administrative controls. The regulation does not specify the particular requirements to be included in plant TSs.

As discussed in 10 CFR 50.36(c)(2), LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the TSs until the LCO can be met.

In accordance with 10 CFR 50.36(c)(3), SRs are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions of operation will be met.

The proposed changes would revise TS 3/4.7.10 to include two new LCO configurations and add two new SRs. In addition, the LAR requested to revise TS 3/4.7.6 to add a note limiting single control room emergency air conditioning system train alignments during the two new proposed LCO configurations.

The NRC staff evaluated the proposed changes and determined that they meet the regulatory requirements of 10 CFR 50.36 as discussed in Sections 3.3 and 3.5.9 of this safety evaluation.

2.2 Regulatory Guidance

The NRC staff identified the following regulatory guidance as being applicable to the proposed amendments:

- NUREG-0800, "Standard Review Plan for the Review of the Safety Analysis Reports for Nuclear Power Plants: LWR Edition;"
- NUREG-1431, Revision 4, "Standard Technical Specifications - Westinghouse Plants," Volume 1, "Specifications," and Volume 2, "Bases;"[3] and
- NUREG-0452, Revisions 0 through 4, "Standard Technical Specifications for Westinghouse Pressurized Water Reactors."[4]

3.0 TECHNICAL EVALUATION

3.1 Background

The Salem AB CH system is classified as safety-related and supplies cooling water to the heat removal systems serving the control room, electrical equipment and relay rooms, and other safety and non-safety-related equipment rooms. The AB CH system contains three chillers and two chilled water pumps per unit. Six separate chiller skids, three per unit, reject heat to the ultimate heat sink via the service water (SW) system. The Salem chillers currently utilize hydrochlorofluorocarbon (HCFC)-22 (R-22) as their refrigerant. Through Title VI of the Clean Air Act, which is implemented by the Environmental Protection Agency (EPA), the United States will phase out the production and sale of R-22 because of its ozone depletion potential. Currently, operators of existing R-22 refrigeration chillers are required to monitor and recover any R-22 that leaks. As a result, the existing chillers at Salem will ultimately require modification or replacement to meet the system demands with an acceptable refrigerant. Consequently, PSEG plans to replace the existing chillers with new ones that use refrigerant R-134a, which the EPA has determined presents a low risk to humans exposed to it in small amounts. Additionally, PSEG has determined that the new chillers will be situated in the same location as the existing chillers.

Salem TS 3/4.7.10 requires all three chillers and both chilled water pumps to be operable during all modes of operation (MODES 1, 2, 3, 4, 5, and 6) and during movement of irradiated fuel assemblies. Currently, the Salem TSs allow the AB CH system to be operated with less than three operable chillers for a maximum of 14 days by securing some non-essential AB CH loads. Replacing the Salem chillers will take longer than 14 days per chiller; thus, the current TS

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[3] ADAMS Accession Nos. ML12100A222 and ML12100A228, respectively

[4] ADAMS Accession No. ML102590431 (Revision 4)

restricts the ability of PSEG to replace the existing chillers. In addition, PSEG's ability to perform maintenance on common chilled water line components (common line components are components on lines that require the removal from service of all of a single unit's chillers/pumps in order to perform maintenance) is currently restricted by the TSs. PSEG proposes to modify the requirements for the AB CH system during periods of the year when fewer chillers are needed to support the system's safety functions (i.e., cooler portions of the year). PSEG also proposes the use of the existing cross-tie to permit maintenance on common line AB CH components. To reduce demand on the AB CH system when operating with fewer chillers or when using the cross-tie, upgrades and maintenance will be performed during cooler portions of the year, consistent with the operating restrictions proposed for the TSs.

The piping cross-tie between Salem, Unit Nos. 1 and 2, AB CH system is part of the original plant design. The AB CH system was added to the TSs in 1997 by License Amendment Nos. 199 and 182,[5] to comply with the requirements of 10 CFR 50.36(c)(2), when the two individual Salem control rooms were combined into a common control room complex. Amendment Nos. 199 and 182 did not address cross-tie operation, which subsequently resulted in maintenance and operational challenges. Portions of AB CH piping cannot be taken out of service for maintenance without complete shutdown of that unit's AB CH system. Since the system is required to be operable in all modes and during the movement of irradiated fuel assemblies, the only time a unit's AB CH system TS is not applicable is when the unit is defueled and not moving irradiated fuel. Each Salem unit provides a single train of the two train control room emergency air conditioning system (CREACS) for the common control room. Therefore, even when defueled, the defueled unit's AB CH system must remain available to support the operability of the common control room ventilation system for the other unit.

3.2 System Description

3.2.1 Auxiliary Building Chilled Water System

By letter dated November 5, 2015, the licensee provided, in part, the following description of the AB CH system:

> The AB CH System includes three packaged liquid chillers and two Chiller Water pumps. Each pump circulates nominally 370 gpm [gallons per minute] of chilled water at 200 feet total head in a closed loop from the chillers to the heat loads and then back to the pump suction header. Each chiller evaporator removes heat from the returning chilled water and, in the chiller condenser, rejects the heat to the ultimate heat sink via the SW System. The chillers are designed to supply chilled water at 44°F [degrees Fahrenheit], and cycle on and off as a function of chilled water return temperature. 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 (NPSH) for the pumps. The chiller compressor motors are powered from separate 460 VAC [volts alternating current] Vital Buses. The two pumps are powered from separate 230 VAC Vital Buses. The heat loads serviced by the AB CH System for each Salem Unit are as follows:

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[5] ADAMS Accession No. ML011720149

Safety Related Heat Loads:

- Control Area Air Conditioning System (CAACS) Cooling Coils
- Control Room Emergency Air Conditioning System (CREACS) Cooling Coil
- Emergency Control Air Compressor (ECAC) Coolers

Non-Safety Heat Loads:

- Penetration Area Cooler Units (PACUs)
- Miscellaneous Room Coolers (Unit 2 only), including the primary lab room cooler, secondary lab room cooler, counting room cooler and post-accident sampling room cooler

...

The three-way control valve (CH74) located on the discharge side of the CAACS coils, originally designed to control flow through the coils, is fixed in the full open position to allow full flow through the coils all the time to simplify system operation and improve reliability. Similarly, the CH168 control valve located on the discharge side of the CREACS coil is fixed in the full open position for single failure concerns, allowing flow through the coil during all modes of operation.

Chilled water flow to the ECAC coolers is normally isolated and is provided when the ECAC is operating by an automatic isolation valve that opens when the compressor starts. The ECAC is normally aligned to chilled water but can be isolated from the chilled water system and provided cooling from the service water system.

Chilled water flow is provided to the PACUs as required to maintain the environmental conditions in the mechanical penetration area for protection of equipment. Room thermostats are provided to modulate three-way control valves to each PACU. The supply of chilled water to the PACU cooling coils is automatically isolated by redundant isolation valves (CH151 and CH30) on a safety injection signal.

The Salem Unit 2 AB CH provides chilled water to the miscellaneous room coolers in addition to the uses described above. Three-way control valves modulate flow to each room cooler based on room temperature. Chilled water flow to these non-safety room cooling coils is automatically isolated by redundant isolation valves on a safety injection signal.

3.2.1.1 AB CH Operations

The licensee stated that the AB CH system operates in the following five configurations:

A. Normal Configuration

During normal plant operation, the AB CH System in each unit provides chilled water to the CAAC coils and PACUs. In addition to these loads the Unit 2 AB CH System supplies chilled water to the miscellaneous room coolers. The ECAC is normally in standby with cooling flow through the ECAC isolated. When the ECAC is operated for testing or when the Station Air Compressors are not available or not operating, the AB CH System provides chilled water to the ECAC coolers.

B. Accident Safety Injection (SI) Configuration

During the accident SI configuration, the CAV [Control Area Ventilation] System is automatically switched to the accident pressurized mode which starts the CREACS fans. The CAACS coils continue to receive chilled water and the ECAC is assumed to be operating (with chilled water flow to the ECAC coolers) due to a loss of power or loss of station air compressors. On an SI signal, redundant isolation valves automatically isolate chilled water flow to the PACUs and the miscellaneous room coolers.

Both the Unit 1 and Unit 2 CREACS coils provide cooling to the common CRE [control room envelope] and each Unit's CAACS coils provide cooling to their respective Relay and Electrical Equipment Rooms. If one CREACS train is unavailable, the system is aligned in the single train filtration mode (also referred to as "Maintenance Mode"). A single CREACS coil is capable of maintaining the CRE at $\leq$ 85°F, except for the Data Logging Rooms, which are maintained at $\leq$ 90°F.

C. Accident High Radiation (RMS) Configuration

During the accident RMS configuration, the CAV System is automatically switched to the accident pressurized mode which starts the CREACS fans. The CAACS coils continue to receive chilled water and the ECAC is assumed to be operating (with chilled water flow to the ECAC coolers) due to a loss of power or loss of station air compressors. The PACUs and the miscellaneous room coolers are not automatically isolated by the RMS signal and continue to receive chilled water flow until manually isolated by procedure. Both the Unit 1 and Unit 2 CREACS coils provide cooling to the common CRE. Chilled water to each Unit's CAACS coils provides cooling to their respective Relay and Electrical Equipment Rooms. On initiation of an accident high radiation (RMS) signal when the CAV system is in the Maintenance Mode, a single CREACS coil is capable of maintaining the CRE at $\leq$ 85°F, except for the Data Logging Rooms, which are maintained at $\leq$ 90°F.

D. Loss of Offsite Power (LOOP) Configuration

During a LOOP, chilled water flow is maintained to Units 1 and 2 CAACS coils to provide cooling to the CRE and their respective Relay and Electrical Equipment Rooms. Each Unit's ECAC is started and chilled water is supplied to the ECAC coolers. The PACUs and miscellaneous room coolers are isolated.

E. Fire Outside Control Room Area (Recirculation)

During a postulated fire outside the control area, the CAV System is manually switched to the full recirculation configuration. This initiates the CREACS fans. The CAACS coils continue to receive chilled water. The PACUs and miscellaneous room coolers are manually isolated. Both the Unit 1 and Unit 2 CREACS coils provide cooling to the common CRE and the CAACS coils provide cooling to their respective Relay and Electrical Equipment Rooms.

3.2.1.2 AB CH Cross-tied Operation

PSEG is proposing AB CH cross-tied operation as one of the new LCO configurations. The existing cross-tie piping that connects the Salem, Unit Nos. 1 and 2, AB CH system is safety-related seismic class 1 and can enable the chillers from one unit to supply cooling to both units. Both the supply header cross-tie and the return header cross-tie contain one manual isolation valve that provides the boundary between the units.

3.2.1.3 Electrical Configuration for AB CH System

The chilled water system consists of three 50 percent capacity chillers and two 100 percent capacity circulating pumps per unit. Each chiller is powered from a separate diesel-backed bus, and each of the circulating pumps is also powered from a separate diesel bus. During emergency operation, two chillers and one pump will meet all the safety-related chilled water cooling load requirements for that respective unit based on current calculations. This provides some flexibility for backup and maintenance. The common CRE provides additional flexibility by cooling the CRE with a single CREACS coil using the maintenance mode.

3.2.2 Control Room Emergency Air Conditioning System

The CAACS and the CREACS are designed to maintain room temperatures within limits required for operation, maintenance, and testing of plant controls and permit continuous occupancy under normal and design accident conditions.

The CAACS and CREACS are subsystems of the CAV system, which includes the common CRE, relay rooms, and electrical equipment rooms. During normal operation, CAACS provides cooling for all the CAV system areas. During accident conditions, CREACS provides cooling for the CRE, and CAACS provides cooling for the relay rooms and electrical equipment rooms. CAACS maintains the areas it serves at $\leq$ 76 °F during normal and accident conditions.

CREACS maintains the CRE at ≤ 85 °F during accident conditions except for the data logging rooms, which are maintained at ≤ 90 °F.

3.3 Proposed TS Changes

3.3.1 Chilled Water System

In order to support replacing the existing chillers, perform maintenance on common line components, and for unplanned operational issues, PSEG proposed two additional operating configurations to TS 3/4.7.10. The proposed changes would create a three-tier LCO configuration, each with its own operability requirements. The existing configuration requiring all three chillers to be operable would be designated as 3.7.10a. The two new configurations would be designated as 3.7.10b and 3.7.10c. Configuration 3.7.10b would require two chillers to be operable on the applicable unit. Configuration 3.7.10c would require that three operable chillers on one unit provide cooling water to both units by utilizing the existing cross-tie. The two new configurations would be restricted to colder months of the year (i.e., November 1 through April 30), and would require some AB CH system non-essential loads be secured. The proposed changes described below are a cumulative representation of the changes proposed in PSEG's September 11, 2015, LAR, including modifications and additional changes proposed in PSEG's supplemental letters. In all cases, changes to Unit 1 are described and Unit 2 is similar. All changes and additions are shown in **bold**.

The existing TS 3/4.7.10, LCO, and applicability are:

3.7.10. The chilled water system loop which services the safety-related loads in the Auxiliary Building shall be OPERABLE with:

a. Three OPERABLE chillers

b. Two OPERABLE chilled water pumps

APPLICABILITY: ALL MODES and during movement of irradiated fuel assemblies.

The proposed changes are:

3.7.10. The chilled water system loop which services the safety-related loads in the Auxiliary Building shall be OPERABLE with **one of the following configurations**:

	a	b	c
Configuration	1. Three OPERABLE chillers and, 2. Two OPERABLE chilled water pumps	**1. Two OPERABLE chillers and,** **2. Two OPERABLE chilled water pumps**	**1. Three OPERABLE chillers and,** **2. Two OPERABLE chilled water pumps** **from either Unit 1 or Unit 2 (Units Cross-tied)(2)**

APPLICABILITY	1. ALL MODES and during movement of irradiated fuel assemblies	**1. From November 1 through April 30 in ALL MODES and during movement of irradiated fuel assemblies[#]** **2. The Unit 1 Emergency Control Air Compressor (ECAC) is isolated from the chilled water system** **3. Chilled water flow to the third chiller that is not in service is isolated[(1)]** **4. Control Room Emergency Air Conditioning System (CREACS) alignment** **a. BOTH CREACS trains OPERABLE, no additional chilled water heat load removal required, OR** **b. Single CREACS train OPERABLE (TS 3.7.6.1 ACTION a.) the following restrictions apply** **i. Alignment only permitted to Unit 2** **ii. Unit 2 must be in the LCO 3.7.10a configuration** **iii. Non-essential heat loads are isolated from the chilled water system on BOTH Units**	**1. From November 1 through April 30 in ALL MODES and during movement of irradiated fuel assemblies[##]** **2. The Unit 1 and Unit 2 ECACS are isolated from the chilled water system** **3. Non-Essential heat loads are isolated from the chilled water system on BOTH Units** **4. BOTH CREACS trains are operable per TS 3.7.6.1 (single filtration train alignment is not permitted)** **5. Unit chilled water cross-tie valves are OPEN** **6. Administrative controls are in place for the Unit providing the required components to notify the other Unit if a chiller or pump becomes inoperable**

 # The LCO 3.7.10b configuration may only be used for periods of 60 contiguous days. The 60-continguous days does not apply for LCO 3.7.10b entry to support the replacement of all 6 original chillers (Units 1 and 2).

The LCO 3.7.10c configuration may only be used for periods of 45 continuous days.

The existing TS 3/4.7.10, actions for MODES 1, 2, 3, and 4 are:

ACTION: MODES 1, 2, 3, and 4

a. With one chiller inoperable:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Restore the chiller to OPERABLE status within 14 days or;

3. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two chillers inoperable:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Align the control room emergency air conditioning system (CREAC) for single filtration operation using the Salem Unit 2 train within 4 hours and;

3. Restore at least one chiller to OPERABLE status within 72 hours or;

4. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

The proposed changes are:

ACTION[(3)]: MODES 1, 2, 3, and 4

a. With one **of the required** chillers inoperable:

1. Remove [(4)] the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Restore the chiller to OPERABLE status within 14 days or;

3. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two **of the required** chillers inoperable[(5)(6)]:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Align the control room emergency air conditioning system (CREACs) for single filtration operation using the Salem Unit 2 train within 4 hours and;

3. Restore at least one chiller to OPERABLE status within 72 hours or;

4. Be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

The existing TS 3/4.7.10, actions for MODES 5 and 6 or during movement of irradiated fuel assemblies are:

ACTION: MODES 5 and 6 or during movement of irradiated fuel assemblies.*

a. With one chiller inoperable:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Restore the chiller to OPERABLE status within 14 days or;

3. Suspend CORE ALTERATIONS and movements of irradiated fuel assemblies.

b. With two chillers inoperable:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Align the control room emergency air conditioning system (CREACs) for single filtration operation using the Salem Unit 2 train within 4 hours and;

3. Restore at least one chiller to OPERABLE status within 72 hours or;

4. Suspend CORE ALTERATIONS and movements of irradiated fuel assemblies.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

* During Modes 5 and 6 and during movement of irradiated fuel assembles, chiller water components are not considered to be inoperable solely on the basis that the backup emergency power source, diesel generator, is inoperable.

The proposed changes are:

ACTION[3]: MODES 5 and 6 or during movement of irradiated fuel assemblies.*

a. With one **of the required** chillers inoperable:

1. Remove [4] the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Restore the chiller to OPERABLE status within 14 days or;

3. Suspend CORE ALTERATIONS and movements of irradiated fuel assemblies.

b. With two **of the required** chillers inoperable[5][6]:

1. Remove the appropriate non-essential heat loads from the chilled water system within 4 hours and;

2. Align the control room emergency air conditioning system (CREACs) for single filtration operation using the Salem Unit 2 train within 4 hours and;

3. Restore at least one chiller to OPERABLE status within 72 hours or;

4. Suspend CORE ALTERATIONS and movements of irradiated fuel assemblies.

c. With one chilled water pump inoperable, restore the chilled water pump to OPERABLE status within 7 days or suspend CORE ALTERATIONS and movement of irradiated fuel assemblies.

* During Modes 5 and 6 and during movement of irradiated fuel assembles, chiller water components are not considered to be inoperable solely on the basis that the backup emergency power source, diesel generator, is inoperable. **This is not applicable to the LCO 3.7.10c configuration**.

PSEG proposed to add items ‘d’ and ‘e’ to the existing TS 3/4.7.10 SRs. The existing SRs in items a, b, and c are unchanged. The proposed modified SRs are:

SURVEILLANCE REQUIREMENTS

4.7.10 The chilled water loop which services the safety-related loads in the Auxiliary Building shall be demonstrated OPERABLE.

a. In accordance with the Surveillance Frequency Control Program by verifying that each manual valve in the chilled water system flow path servicing safety related components that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. In accordance with the Surveillance Frequency Control Program, by verifying that each automatic valve actuates to its correct position on a Safeguards Initiation signal.

c. In accordance with the Surveillance Frequency Control Program by verifying that each chiller starts and runs.

d. When in the LCO 3.7.10b configuration verify once per 24 hours:

(i) The Unit 1 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.

PSEG proposed to add new notes to the existing TS 3/4.7.10 as shown below.

NOTES

(1) When transitioning from the LCO 3.7.10b to the 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
(3) When in the LCO 3.7.10c configuration ACTIONs are applicable for both Units
(4) When in the LCO 3.7.10c configuration this ACTION has already been implemented

(5) When in the LCO 3.7.10b configuration, implement Action b.2 AND Action b.4 OR transition to the LCO 3.7.10c configuration

(6) When in the LCO 3.7.10c configuration, proceed directly to Action b.4

3.3.2 Control Room Emergency Air Conditioning System

PSEG proposed to modify TS 3/4.7.6 by adding a note (**) to ACTION a as described below. Changes and additions are shown in **bold** (Unit 1 is described, Unit 2 is similar; however, the Unit 1 LCO is 3/4.7.6.1, and the Unit 2 LCO is 3/4.7.6). No other changes to TS 3/4.7.6 were proposed.

TS 3/4.7.6.1 ACTION a (MODES 1, 2, 3, and 4) is:

a. With one filtration train inoperable, align CREACS for single filtration train operation** within 4 hours, and restore the inoperable filtration train to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

** **Alignment only permitted if the Unit with the operable CREACS train is also in Chilled Water System LCO 3.7.10a configuration. Alignment is not permitted if in the LCO 3. 7.10c configuration.**

TS 3/4.7.6.1 ACTION a (MODES 5 and 6 or during movement of irradiated fuel assemblies) is:

a. With one filtration train inoperable, align CREACS for single filtration train operation** within 4 hours, or suspend movement of irradiated fuel assemblies.

** **Alignment only permitted if the Unit with the operable CREACS train is also in Chilled Water System LCO 3.7.10a configuration. Alignment is not permitted if in the LCO 3. 7.10c configuration.**

The NRC staff evaluated the proposed changes and determined that they met the regulatory requirements of 10 CFR 50.36 as discussed in Section 3.5.9 of this safety evaluation.

3.4 <u>PSEG's Evaluation</u>

3.4.1 Heat Loads for Normal and Accident Conditions

As described in the LAR, the control room ventilation is a shared system with each Salem unit providing one train of the two train system. The CAV can be operated in either normal alignment (both trains operating) or maintenance mode (single train operating). During normal operation, the CAACS is supplying the CRE and the CREACS is isolated and in standby. During an accident, the CREACS system is actuated and supplies cooling to the CRE, and the CAACS is isolated from the CRE.

Heat loads are provided for single train alignment (known as maintenance mode) of the CAV where one CAACS or CREACS unit is cooling the entire CRE. For maintenance mode, the CAACS on one unit is cooling the entire CRE during normal operation, and the CREACS on that unit is cooling the entire CRE for accident conditions. The heat loads for Salem, Unit Nos. 1 and 2, CAACS during normal operation while in maintenance mode include the entire CRE for both units (the unit that is not supplying the CRE has a lower heat load). The heat loads for Salem, Unit Nos. 1 and 2, CREACS during accident conditions while in maintenance mode reflect the heat load as if that unit is supplying the CRE.

The current loads for normal operations vary from a low of 39.4 tons[6] per chiller (normal CAV alignment) to a high of 55.5 tons per chiller (maintenance mode), assuming summer conditions and all three chillers operating as required by current TS 3/4.7.10. The loads for accident operations vary from a low of 44.8 tons per chiller (normal CAV alignment) to a high of 50.3 tons per chiller (maintenance mode), assuming summer conditions and two chillers operating due to the postulation of a single failure.

Each current chiller rating is 61.5 tons, which provides margin over the current required cooling from each chiller. PSEG stated that the design specification for the replacement chillers includes an additional 10 percent margin for the heat loads (61.1 tons per chiller). The proposed replacement chillers are rated at 62.5 tons; therefore, they will provide the required cooling for both normal and accident conditions with an additional 10 percent heat load margin. This rating is based on an SW temperature to the condensers of 93 °F (summer conditions), which is a 3 °F margin above the design value of 90 °F.

The new TS configurations, two chiller (TS 3.7.10b) and cross-tied (TS 3.7.10c), are restricted to November to April, so when the system heat loads will be less. The ECAC load will be zero since the proposed TS restrictions will require the ECAC to be isolated from the AB CH system. For the two chiller configuration, the non-essential loads (PACUs and miscellaneous coolers) remain aligned with both trains of CAV operable and are isolated when transitioning to maintenance mode. For the cross-tie configuration, the non-essential loads will be isolated on both units; therefore, these heat loads will be zero. However, required cooling from each individual chiller in proposed TS 3.7.10b and TS 3.7.10c will be higher than the current configuration due to lower number of operating chillers.

PSEG performed analyses to show that for two chiller and cross-tie configurations, a combination of reduced heat loads and increased cooling capability of the existing chillers during the winter months satisfies the design basis for the AB CH system, which includes the main control room, relay room, and electrical equipment rooms. PSEG found that the proposed changes continue to support the existing accident analyses. Configuration 3.7.10a is the same as the existing LCO configuration in TS 3.7.10 and, therefore, no new supporting calculations were necessary.

3.4.2 Chiller Capacity

The Salem, Unit Nos. 1 and 2, AB CH systems are modeled using computer-based analysis. The calculation determined the chilled water flow rate to each component cooled by the AB CH

[6] One ton = 12,000 British thermal unit (BTU)/hour (hr)

system and the flow through each of the chillers while the system is operating with either two chillers per unit or three chillers on a single unit (cross-tied). The evaluations incorporated the isolation of components as required by the proposed TSs. In addition, the calculations assumed one chiller and one pump less than required by proposed LCOs 3.7.10b and 3.7.10c. This supports single failure during an accident.

PSEG provided the flow rates calculated at normal operating and accident conditions for the proposed two chiller and cross-tied configurations. The flow through each of the operable chillers, CAACS, and CREACS units for both Salem, Unit Nos. 1 and 2, was provided. The flow rate to each chiller increases during two chiller operation because flow is isolated to the third chiller.

In addition, PSEG stated that:

> Cooling to the Chiller Condensers is provided by the SW system, which is supplied by the Delaware River. A control valve at the outlet of each chiller condenser (SW102) throttles SW flow to maintain a constant condenser pressure. A recirculation line runs from the condenser outlet back to the inlet. This line contains a recirculation pump that runs during colder SW temperature conditions to prevent potential overcooling of the condensers and possible trip on freeze protection. To reduce demand on the AB CH system when in Two Chiller or Cross-Tied configuration, chiller replacement and other system maintenance will be performed during winter months, and thus the recirculation pumps will be running.

PSEG's calculation determined the heat removal capacity of the chiller unit, considering the full capacity of the chiller (i.e., design condition) and the SW recirculation line for the chiller condenser in operation. The calculation uses bounding SW system and AB CH system flow rates. Table 4-4 from the September 11, 2015, LAR, reproduced below, provides the chiller design capacity for a specific chiller AB CH outlet temperature and provides the maximum SW temperature where these chiller capacities are valid.

Table 4-4 Chiller Heat Load verses Chilled Water Outlet Temperature

Chilled Water Outlet Temperature (°F)	Evaporator Heat Load (BTU/hr)	Evaporator Heat Load (tons)^^	Maximum Service Water Temperature (°F)
42.4 (Note 1)	732,900	61.0	82.7
43.0	742,700	61.9	82.4
44.0	759,300	63.3	82.0
46.0	792,100	66.0	81.1
48.0	826,700	68.9	80.2
50.0	861,200	71.7	79.3
52.0	896,500	74.7	78.4
54.0	932,700	77.7	77.5

Note 1 – The chiller design supply temperature is 44°F but Reference 3 determined that the chiller can operate down to 42.4°F while operating within the chiller control setpoints.

^^Chiller tonnage was converted from BTU/hr by the NRC staff for unit simplification.

The results above are based on an SW flow with the recirculation line valve fully open. As the temperature of the SW at the chiller condenser decreases, the condenser pressure drops. As a result, the recirculation line valve restricts SW flow to the chiller condenser to maintain the condenser pressure and prevent freezing in the chiller evaporator section. This control function makes the design heat load of the chiller relatively independent of SW temperature below the values presented above.

3.4.3 Service Water Temperature

The maximum allowable SW temperature from the above chart is 77.5 °F. However, additional calculations related to two chiller operations and cross-tie operations determined the maximum allowable SW temperature to be 78.3 °F and 79.9 °F, respectively.

PSEG calculated the total heat load on the AB CH system and the resulting chiller outlet temperature during normal and accident conditions while in two chiller operation. The chiller outlet temperatures are used to determine the maximum SW temperature using Table 4-4 of the LAR. The chiller AB CH outlet temperatures and maximum SW temperatures for two chiller operation are provided in LAR Table 4.6, provided below.

Table 4-6 Chiller Outlet Temperatures and Maximum SW Temperatures for Two Chiller Operation

Condition	Chiller AB CH Outlet Temperature (°F)	Maximum SW Temperature (°F)
Normal Operation	50.2	79.2
Accident Conditions	52.2	78.3
Maintenance Mode (standby)	42.9	82.5
Maintenance Mode (accident)	42.4	82.7

PSEG calculated the total heat load on the AB CH system and the resulting chiller outlet temperature during normal and accident conditions while in cross-tied operation. The chiller outlet temperatures are used to determine the maximum SW temperature using LAR Table 4-4. The chiller AB CH outlet temperatures and maximum SW temperatures for cross-tied operation are provided in LAR Table 4-11, provided below.

Table 4-11 Chiller Outlet Temperatures and Maximum SW Temperatures for LCO 3.7.10c

Condition	Chiller AB CH Outlet Temperature (°F)	Maximum SW Temperature (°F)
Normal Operation	44.6	81.7
Accident Conditions	48.6	79.9

PSEG obtained the historical Delaware River temperatures from 1948 to 2015 from various sources. The maximum monthly temperatures from all of these sources is provided in

Table 4-4.1 of the September 11, 2015, LAR, reproduced below. The shaded months are the ones subject to this request.

During the months from November to April, the historical data shows that the Delaware River has more than a 10 degree margin. Limiting operation of the two chiller and cross-tied configurations to the months of November to April ensures that the SW temperature (supplied by the Delaware River) is below the highest allowed temperature.

Table 4-4.1 Monthly Delaware River Water Temperatures

Monthly Delaware River Water Temperatures	Maximum Monthly Temperature (°F)	Margin Based on 78.3 °F (Configuration b)*	Margin Based on 79.9 °F (Configuration c)*
January	49.4	28.9 °F	30.5 °F
February	49.0	29.3 °F	30.9 °F
March	57.0	21.3 °F	22.9 °F
April	66.7	11.6 °F	13.2 °F
May	81.9		
June	85.4		
July	90.5		
August	88.7		
September	85.5		
October	78.1		
November	66.2	12.1 °F	13.7 °F
December	60.1	18.2 °F	19.8 °F

*Temperature margin was converted by the NRC staff.

3.4.4 Control Area Ventilation System

PSEG's calculation models the Salem, Unit Nos. 1 and 2, CAV systems using computer analysis accounting for: (1) the AB CH flows to the CAACS and CREACS and (2) the outside air conditions that are applicable when the AB CH system maintenance will be performed (November through April). This calculation determines the air temperatures in the control area (CRE and non-CRE rooms) and the total heat load on each of the CAACS and CREACS.

PSEG stated that the temperature and solar irradiance values used in the CAV evaluation are from the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), Fundamentals Handbook, 2009. Solar irradiance refers to the applicable parameters required to calculate the solar-related radiative heat loads based on the distance between the earth and the sun, the angle of the sun, and other factors. The solar irradiance values are for the 21st day of the month.

PSEG also used the ASHRAE Fundamentals Handbook to determine that the maximum temperatures during the period of November to April occur in April. Accordingly, PSEG elected to use the outside air conditions in April as the basis for the evaluations. The outside air conditions from Table 4-5 of the September 11, 2015, LAR, are reproduced below.

Table 4-5 Outside Air Conditions

Daily Average Temperature	75.0°F
Maximum peak Temperature	84.6°F
Solar Irradiance	Based on conditions for the month of April

PSEG provided the following information:

> The outside air temperature fluctuates diurnally and also fluctuates from day to day due to local weather variations. The GOTHIC model uses a diurnal temperature input based on the 0.4% design peak and mean temperatures for the month of April. It is acknowledged that the outside air temperature may exceed this temperature during the month of April for short periods of time. However, due to the thermal mass of the control building and the small percentage of outside air that is drawn into the CAV system, any short period of time when actual outside air temperatures exceed the model temperatures will not invalidate the conclusions of the evaluation. During the cooler winter months, it is less likely that the April 0.4% design temperatures will be exceeded for short periods of time.
>
> The solar irradiance for April twenty-first is appropriate for the months of November through April. It is noted that at some times during this period the actual solar irradiance may be higher than the April 21st values (e.g., for the final days in April). This slight change in solar irradiance will have a negligible impact on the overall AB CH system performance since the internal heat loads are much higher than the heat addition due to the full solar irradiance. Using the outside air conditions for the month of April is conservative and appropriate for conditions from October[8] through April.

PSEG stated that the analysis results for single filtration train alignment (maintenance mode) during the cross-tie configuration indicated that control room temperatures will exceed the acceptance criterion temperatures. Therefore, single filter train alignment is prohibited by proposed LCO 3.7.10c. With this prohibition, the maximum calculated temperatures in the control area rooms are always lower, with varying degrees of margin, than acceptance criterion temperatures.

3.4.5 Limitations of Proposed AB CH Configurations b and c

In the September 11, 2015, LAR, PSEG stated that the evaluations support operation of Salem, Unit Nos. 1 and 2, chilled water systems in the two chiller configuration and in the cross-tie configuration. The two chiller configuration analyses demonstrate that the system will continue to provide required cooling capability to the control room and safety-related areas during normal operation and in the event of an accident. To accommodate two chiller configuration, certain limitations must be established and maintained. These limitations have been incorporated into the proposed TS 3/4.7.10. The limitations as listed in Table 4-8 of the September 11, 2015, LAR, are reproduced, in part, below:

Table 4-8 Limitations and Required Configuration for AB CH System During Two Chiller Operation

Equipment or Condition	Operating Condition			
	Normal Operations	**Accident Conditions at either Unit**	**Maintenance Mode (Normal)**	**Maintenance Mode (Accident)**
AB CH Pumps	1 pump per unit operating (normal condition)			
Existing AB CH Chillers Operable	2 Chillers per unit (one chiller failure per unit postulated)		2 Chillers in unit undergoing CREACS maintenance; 3 Chillers in unit supplying available CREACS (one chiller failure per unit postulated)	
AB CH Flow to Chillers	AB CH flow secured to out of service chiller in either unit		Flow supplied to all chillers in unit supplying CREACS Flow secured to out of service chiller in opposite unit	
Unit 1 and Unit 2 CAACS	Operating			
Unit 1 and Unit 2 CREACS	Not Operating	Operating	Not Operating	Single train operating
Unit 1 and Unit 2 ECACs	Isolated from Chilled Water			
Unit 1 and Unit 2 PACUs	Operating	Automatically Isolated in Unit experiencing accident	Isolated	Isolated
Laboratory and Room Coolers (Unit 2 Only)	Operating	Automatically Isolated (Unit 2 Accident only)	Isolated	Isolated
Operation of the SW Chiller Condenser Recirculation Pump	Allowed			
Maximum SW Temperature	79.2°F	78.3°F (limiting value)	82.5°F	82.7°F
Maximum Mean Outside Air Temperature	75°F			

Maximum Peak Outside Air Temperature	84°F
Period of Acceptable Two Chiller Operation	November through April

The cross-tie configuration analyses demonstrate that the system will continue to provide required cooling capability to the control room and safety-related areas during normal operation and in the event of an accident. To accommodate the cross-tie configuration, certain limitations must be established and maintained. The cross-tie limitations have been incorporated into the proposed TS 3/4.7.10. The limitations as listed in Table 4-13 of the September 11, 2015, LAR, are reproduced, in part, below:

4-13 Limitations and Required Configuration for AB CH System Cross-Tied Operations

Equipment or Condition	**Operating Condition**	
	Normal Operations	**Accident Conditions at either Unit**
AB CH Pumps	1 pump operating (normal condition)	
Existing AB CH Chillers in Service	3 chillers from supplying unit (one chiller failure postulated)	
Unit 1 and Unit 2 CAACS	Operating	
Unit 1 and Unit 2 CREACS	Not Operating	Operating
Unit 1 and Unit 2 ECACs	Isolated from Chilled Water	
Unit 1 and Unit 2 PACUs	Isolated from AB CH system	
Laboratory and Room Coolers (Unit 2 Only)	Isolated from AB CH system	
Operation of the SW Chiller Condenser Recirculation Pump	Allowed	
Operation of CAV System in Single Filtration Alignment (Maintenance) Mode	Not Allowed	
Maximum SW Temperature	81.7°F	79.9°F (limiting value)
Maximum Mean Outside Air Temperature	75°F	
Maximum Peak Outside Air Temperature	84°F	
Period of Acceptable Cross-Tie Operation	November through April	

3.5 NRC Staff Evaluation

3.5.1 Two Chiller Configuration

3.5.1.1 Two Chiller Configuration Field Testing

PSEG stated in the September 11, 2015, LAR that the two chiller configuration is proposed, in part, to support chiller replacement. PSEG stated that calculations were used to model this configuration. By letter dated February 17, 2016,[7] the NRC staff requested an explanation of the field testing that will take place to validate the calculation/model.

In its March 31, 2016, response, the licensee stated:

> PSEG will measure AB CH flows to individual components in the Two Chiller configuration (Chillers, CAACS cooler and CREACS cooler) to ensure they agree with the analyzed flow rates. The testing will be performed on both Unit 1 and Unit 2, with the proposed applicability conditions of the LCO 3.7.10b configuration met (i.e. , cross-tie valves closed, non-essential heat loads aligned on both Units, ECACs isolated, third chiller isolated).

PSEG determined that thermal performance testing, including combinations of old and potential new chillers, is unnecessary. PSEG made this determination, in part, based on the CAV GOTHIC model being benchmarked against plant data and/or manufacturer data and operating experience showing no challenges to CAV room temperature design limits under summer heat load conditions. The Salem chillers operate independent of each other, with both the existing and potential new chillers providing 44 °F AB CH outlet temperature. In addition, the various controls (SW flow modulation, refrigerant flow modulation, ability to respond to system load demands) designed to provide chilled water outlet temperature of 44 °F up to the design SW temperature of 90 °F are in both the existing and potential new chillers. Therefore, different combinations of existing and potential new chillers will not impact cooling to system loads, and testing of different combinations is not required.

Based on the above discussion, AB CH flow rates will be verified in the field for the two chiller configuration. The testing will be performed on both Salem, Unit Nos. 1 and 2, with the applicability conditions of LCO 3.7.10b met. Flow rates to the chillers, CAACS coolers, and CREACS coolers, will be verified in the field to ensure they agree with analyzed flow rates. Satisfactory testing for the various flow rates will verify LCO 3.7.10b operability. Thermal performance testing was determined to be unnecessary. The NRC staff finds that the discussed field testing will adequately verify the model used for LCO 3.7.10b, and is, therefore, acceptable.

3.5.1.2 Single Filtration of CREACS

PSEG stated in the September 11, 2015, LAR that while in the two chiller configuration, the single filtration train mode of CREACS can be used. The CREACS is a shared system between Salem, Unit Nos. 1 and 2. It is a two train system with each unit providing a single train of the two train system. Single filtration train mode is used when a train of CREACS is removed from service. The proposed restrictions contained in TS 3.7.10b, Applicability 4, ensure that both

[7] ADAMS Accession No. ML16013A159

Salem units are operated within the bounds of the analyzed configurations of the CREACS and the chilled water system in the event that single filtration train alignment is required to be entered (i.e., unplanned inoperability of a CREACS train) when one unit is in the LCO 3.7.10b configuration.

PSEG further states:

> As discussed in the LAR, single filtration alignment is only permitted if the Unit with the operable CREACS train is also in the Chilled Water system LCO 3.7.10a configuration. The reason for this restriction is that in the single filtration train alignment of CREACS, the heat load from the common control room envelope is placed on the Unit's chilled water system that is providing the operable train of CREACS. Based on the system heat loads while in the single filtration train alignment, two chillers are required to remove the design basis accident heat loads. In order to accommodate a single failure, the Unit providing the single train of CREACS must have all three chillers at the start of an accident. Therefore the Unit that is providing the chilled water to the single filtration train must be in LCO configuration 3.7.10a which requires a minimum all three chillers to be operable.

As stated above, CREACS is a shared system between Salem, Unit Nos. 1 and 2. A single CREACS coil with two operable chillers is capable of maintaining the CRE at ≤ 85 °F, except for the data logging rooms, which are maintained at ≤ 90 °F. The maintenance mode alignment currently exists in TS 3.7.10, but it requires at least three operable chillers in the unit that is supplying chilled water to the CREACS coil to accommodate single failure requirements. The restrictions in LCO 3.7.10b will ensure that this continues to be true. PSEG has shown through analyses that during the colder months, with reduced heat loads, maintenance mode alignment in TS 3.7.10 configuration b is capable of maintaining the required temperatures. Therefore, the NRC staff finds the use of single filtration of CREACS while in LCO 3.7.10b acceptable.

3.5.2 Cross-Tied Configuration

PSEG stated that calculations show that one chilled water pump is capable of supplying the required cooling flow to both units from November 1 through April 30, with the following conditions: (1) chilled water flow to the ECACs is isolated, (2) chilled water flow to the non-essential loads is isolated, and (3) both CREACS trains are required (single filtration train alignment not permitted). The calculations also show that only two chillers are required to remove the heat load.

The proposed cross-tied configuration (LCO 3.7.10c) requires three chillers and two chilled water pumps to be operable. This requirement allows for the single failure of an electrical train that would lead to the loss of one chiller and one chilled water pump. The licensee's analysis shows that with two chillers and one chilled water pump remaining, the cross-tied system can support the accident heat loads on one unit and safe shutdown heat loads on the other unit.

By letter dated November 5, 2015, PSEG stated that:

> The ECAC and non-essential loads are required to be isolated from the chilled water system prior to operating in the cross-tied configuration as required by the

restrictions placed in the TS. Therefore, there is no reliance on the automatic or manual operator action to isolate these loads following a design basis accident or loss of offsite power (LOOP). When entering the cross-tie configuration the chillers and chilled water pumps on the unit that is not supplying the cross-tie are isolated from that Unit's chilled water system. The unit supplying the chilled water cross-tie will then provide cooling to both Unit's CAACS and CREACS coils.

The chilled water valve alignment to the various coolers on both units is not impacted by operation of the cross-tie with exception for pre-isolation of the aforementioned loads. The chiller control valves for the CAACS and CREACS coils are fixed in the full open position, and thus chilled water flow to these coils is maintained in both accident and normal conditions. The CAV System operating modes are not impacted by the chilled water cross-tie and no changes are being made to the CAV control circuits for the operation of the chilled water cross-tie.

The chillers and chilled water pumps receive automatic start signals on an SI signal or LOOP from the SEC [safeguards equipment control]. During SI loading, the electrical loads connected to the safety related bus will continue to operate without interruption. If the unit that is supplying chilled water to both units experiences a LOOP, there will be a brief interruption in chilled water flow to both units until the emergency diesel generators are auto started and loaded. The chillers and chilled water pumps are then automatically sequenced (loaded) onto the bus by the SEC with negligible impact on chiller heat loads at either unit.

3.5.2.1 Cross-tie valves

PSEG stated in the September 11, 2015, LAR, that the cross-tie valves (1CH63 and 1CH78) are manual valves and that, prior to use of the cross-tie, the valves and cross-tie line-up will be tested to confirm 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 the FMEA is consistent with NUREG-0800, "Standard Review Plan" (SRP), Chapter 9, Section 9. 2. 7, "Chilled Water."[8] 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 while the cross-tie is needed.

Since the cross-tie valves have been closed for many years, the condition of the manual cross-tie valves to open, remain open, and perform a passive safety function needs 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 this case, a failure could result in a complete loss of chilled water to one unit.

By letter dated March 31, 2016, the licensee stated, in part, that:

> Previously, PSEG addressed passive failures when the AB CH Technical Specifications (TS) were created. Per the LAR (approved by Amendments 199

[8] ADAMS Accession No. ML14093A350

and 182[1]) that added the AB CH TS, the licensing basis was established that a passive failure is applicable only as an initiating event, consistent with SECY 94-084.

...

a. Both the 1CH63 and 1CH78 valves are 4-inch Velan manually operated gate valves. There are three areas that were investigated for passive closure from the open position.

   1. Valve Design

      The valve stem has an ACME 2G left hand thread. The stem thread and the matching thread of the yoke sleeve maintain the valve in position by their self-locking design and require no additional braking mechanism for backdriving.

   2. Valve Orientation

      The 1CH63 valve is mounted at a 45 degree angle with the handwheel pointed down. The 1CH78 valve handwheel is mounted horizontal to the pipe. For both locations, it is not credible that the disk would fall closing the valve, if the disk were to separate from the stem.

   3. Corrosion or Structural Failure

      The valves are constructed of carbon steel; however, the carbon steel is Parkerized to resist corrosion. Both the wedge and the valve seats are stellite which is a corrosion resistant hard facing. For this valve design, the only dissimilar metal is the valve stem which is made of 410 stainless steel. The high ratio of carbon steel surface area to stainless steel surface area is the most favorable condition for resisting galvanic corrosion. Industry issues involving disk/stem separation occurred with valves in the reverse condition, greater stainless steel surface area compared to carbon steel, which results in a high potential for galvanic corrosion.

      Velan was contacted and a search of the INPO [Institute of Nuclear Power Operations] data base was performed to address structural failures occurring at the T-Head. Velan was not aware of internal structural failures and the INPO data base search corroborated the information supplied by Velan. Structural failures occurring with other manufacturer's valves also involved the use of electric operators and the resultant high thrust loads. The Salem valves are manually operated so a T-Head failure is not considered a credible failure.

...

c. As discussed above, (i) a passive failure is not considered credible, and (ii) a passive failure occurring during a design basis accident does not need to be considered. However, if a cross-tie valve were to fail closed, chilled water would be lost to the isolated Unit and the following actions would be taken:

Entry into procedure[2] S1(2).OP-AB.CAV-0001, Loss of Unit 1 (2) Control Area HVAC will be directed due to a loss of chilled water to the control area ventilation (CAV) system. The FIRE INSIDE CONTROL AREA mode of operation/configuration of CAV will be selected on both Units. Several doors will be opened/realigned, fans installed and non-essential personnel removed from the rooms served by CAV in order to minimize the heatup rate. Unit shutdown will be initiated, if necessary, prior to reaching the following temperature limits:

- Control Room Envelope limit 110 °F
- Electrical Equipment Room limit 120 °F
- Control Area Relay Room limit 122 °F

After 24 hours, if chillers on the opposite unit are unable to maintain Control Room temperatures, the Accident Pressurized (Accident SI Configuration) configuration of CAV is selected on the opposite Unit.

...

d. If one of the Chilled Water cross-tie valves were to fail closed, the Operators would know based on any/all of the following:

1. Control Room temperatures rising
2. High Temperature in Relay Room, (1TD7541, Aux. Annunciator Point 0838)
3. High Temperature in Electrical Equipment Room (1TD7542, Aux. Annunciator Point 0839)

e. The plan for the initial use of the 1CH63 and 1CH78 valves will be the following:

<u>Valve Greasing:</u>

1. Prior to operating each valve, grease will be added to the operator assembly using the zerk fitting located on the yoke.
2. Prior to operating each valve, the valve packing will be loosened.

<u>Valve Repacking:</u>

3. The valve will be repacked with the valve on its backseat.

Valve Flush:

4. The flush of the cross-tie lines can be performed using the Unit 1 or Unit 2 CH system:

...

Valve Flow Test

5. Flow through the 1CH63 and 1CH78 valves will be monitored to ensure it is adequate:

...

Based on the above discussion, the NRC staff finds that once the two cross-tie valves are manually opened, there is reasonable assurance that there is no passive failure that can cause either of the two cross-tie valves to inadvertently go closed. In the event that either of the two cross-tie valves was to close, there are sufficient operator alarms, such as control room high room temperature, to indicate that the chilled water system is no longer operating correctly.

Since the two cross-tie valves have been closed for many years, PSEG staff will perform maintenance on these valves such as greasing and repacking prior to initial use. A flow flush and flow testing will also be performed.

Based on the information provided, the NRC staff finds reasonable assurance that the cross-tie valves will perform their passive safety function.

3.5.2.2 Usage of Cross-Tied Configuration

PSEG stated in the September 11, 2015, LAR 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. By letter dated February 17, 2016, the NRC staff requested details related to why this configuration is preferred over the previous practice.

In response, PSEG stated that currently, maintenance (i.e., internal inspection) or replacement on certain components and piping associated with the chillers cannot be performed without impacting multiple chiller trains (i.e., cannot be performed with existing TSs). The examples provided by the licensee include chiller isolation valves CH22/27, drain valves within the boundary of the chiller isolation valves, chilled water expansion tank, and the piping within the boundary of the chillers and chilled water pumps. In case of chiller isolation valves, freeze seals to isolate the valves have been considered in the past; however, this was ultimately deemed impossible without impacting at least two chillers simultaneously. Since the cross-tie option was eliminated with the approval of Amendment Nos. 199 and 182, the above activities have not been performed.

Based on a review of the information provided, the NRC staff concludes that PSEG cannot currently perform maintenance on certain common chiller components without a unit shutdown. The cross-tie configuration provides an avenue to perform maintenance on common line

components while operating. The staff finds the use of the cross-tie configuration for maintenance on common components acceptable.

By letter dated August 12, 2016, PSEG clarified that the cross-tie configuration would also be used during chiller replacement in lieu of shutting down a unit. Specifically:

> ...PSEG intends to perform the chiller replacement starting in the LCO 3.7.10b configuration; however, in the event of unplanned inoperability of the remaining chiller(s), the LCO 3.7.10c configuration could be entered in lieu of shutting down a Unit with no chilled water. Although Salem has developed abnormal procedure guidance (S1(2).OP-AB.CAV-0001) for shutting down a Salem Unit with no chilled water (described in response to RAI-SBPB-CROSS-TIE-1 Item c), the use of the cross-tie would avoid the risk incurred of shutting down a unit without normal cooling to the Control Area Relay Room (CARR) and Electrical Equipment Room (EER). Use of the cross-tie would restore chilled water flow to the impacted units CAACS coiling coil and therefore allow cooling of the CARR and EER.

PSEG demonstrated that a transition from two chiller configuration to the cross-tie configuration can be safely achieved in a timely manner. In its August 12, 2016 letter, PSEG states:

> The time to open the crosstie valves was determined to be less than two hours. This was verified by a field walk down by a qualified equipment operator. The time to perform the valve manipulations included the pre-job brief, transit time to the Control Area Ventilation (CAV) Equipment Room (including signing in to the radiologically controlled area), locating and setting up ladder (acceptable ladder is already stored in the room), and time to climb ladder and open the valves (opening of the valves was simulated). Although the valves are maintained "locked closed", only standard lockwire with lock tabs is used and therefore no special equipment/tools are required to remove the locks to allow repositioning of the valves. This time also included any required communications with the Control Room. In parallel with opening the crosstie valves, operators will isolate Chilled Water flow to the non-essential loads, as is required for the LCO 3.7.10c configuration. This will be done remotely from the Control Room via pushbuttons on the console, and thus can also be performed within two hours.
>
> A Technical Evaluation was performed to determine CAV room heatup rates conservatively, assuming a loss of Chilled Water for two hours, using the benchmarked CAV GOTHIC model. The GOTHIC model runs were based on no operator contingency actions as included in Abnormal Operating Procedure S1(2).OP-AB.CAV-0001. Currently, since crosstie operation is not allowed, these contingency actions are the only option for Operations on a loss of chillers on one unit. Crosstie operation provides an alternative to the current abnormal procedure actions.
>
> The results show that while the personal comfort temperature limit is exceeded, room temperatures remain below the equipment design temperature limits....

As stated above, PSEG initially plans to perform chiller replacements while in the two chiller configuration. In the event of degraded chiller conditions on the unit that is having its chillers replaced, the licensee has shown, through calculations, that transition to the cross-tied configuration can be accomplished with no adverse room heatup. There is approximately a minimum 14 °F margin between the room temperature limit and the calculated 2-hour heat-up temperature. It is estimated by PSEG to take less than 2 hours to perform this field transition from two chiller configuration to cross-tied configuration. The staff finds the 2-hour duration to be reasonable, given the location of the cross-tie valves and the field walkdowns performed. Therefore, the staff finds the transition from two chiller configuration to cross-tied configuration acceptable.

3.5.2.3 Cross-Tie Configuration Field Testing

PSEG stated that calculations were used to model the cross-tied configuration. By letter dated February 17, 2016, the NRC staff requested an explanation on the field testing that would take place to validate the calculation/model.

In its March 31, 2016, response, the licensee stated:

> PSEG will measure AB CH flows to individual components in the Cross-Tie configuration (Chillers, CAACS cooler and CREACS cooler) to ensure they agree with the analyzed flow rates. The testing will be performed with the proposed applicability conditions of the LCO 3.7.10c configuration met (i.e., cross-tie valves open, non-essential heat loads isolated on both Units, ECACs isolated, CREACS not in single filtration alignment). For this hydraulic test, it is not necessary to account for single failure of a chiller; the system flows will be the same, as flow through the unavailable chiller will continue.
>
> Testing cannot be performed until after NRC approval of LAR since current TS do not allow alignment of AB CH cross-tie. PSEG proposes the following License Condition to capture the testing requirement:
>
>> Concurrent with the first use of the chilled water cross-tie as allowed by Technical Specification 3.7.10c, PSEG shall confirm the required performance of the chilled water system cross-tie.

PSEG determined that thermal performance testing, including combinations of old and proposed new chillers, is unnecessary. PSEG made this determination, in part, based on the CAV GOTHIC model being benchmarked against plant data and/or manufacturer's data and operating experience, showing no challenges to CAV room temperature design limits under summer heat load conditions. The Salem chillers operate independent of each other, with both the existing and proposed new chillers providing 44 °F AB CH outlet temperature. In addition, the various controls (SW flow modulation, refrigerant flow modulation, ability to respond to system load demands) designed to provide chilled water outlet temperature of 44 °F up to the design SW temperature of 90 °F are in both the existing and proposed new chillers. Therefore, different combinations of existing and proposed new chillers would not impact cooling to system loads, and testing of different combinations is not required.

Based on the above discussion, the NRC staff finds that AB CH flow rates will be verified in the field for the cross-tied configuration to ensure that they agree with the analyzed flow rates. Satisfactory testing of the various flow rates will be confirmed concurrent with the first use of the chilled water cross-tie as allowed by TS 3.7.10c. Thermal performance testing was determined to be unnecessary.

The NRC staff finds that the proposed license condition restated below is acceptable.

Concurrent with the first use of the chilled water cross-tie as allowed by Technical Specification 3.7.10c, PSEG shall confirm the required performance of the chilled water system cross-tie.

Based on the above, the NRC staff finds that the discussed field testing will adequately verify the model used for LCO 3.7.10c.

3.5.2.4 Cross-Tie Completion Times

PSEG described the new proposed actions that will occur if LCO 3.7.10c is no longer able to be met in its letter dated March 31, 2016:

> The following discussion is applicable for MODES 1, 2, 3 and 4. The actions are identical for MODES 5 and 6 except that where Unit shutdown is required in MODES 1-4, suspension of CORE ALTERATIONS and movement of irradiated fuel assemblies is required in MODES 5 and 6.
>
> **Inoperability of One Chiller**
>
> Inoperability of one chiller in Configuration 'c' requires restoration of the inoperable chiller within 14 days per ACTION a.2. If ACTION a.2 cannot be met, then Unit shutdown is required per ACTION a.3 (be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours). These ACTIONs are applicable to both Units per the new proposed Note 3 (shown in Attachment 1 Section 2.0 of the LAR and in the TS Markup (Attachment 2)):
>
> > *(3) When in the LCO 3.7.10c configuration ACTIONs are applicable for both Units*
>
> Also, ACTION a.1 to remove appropriate non-essential heat loads within 4 hours is modified by new proposed Note 4:
>
> > *(4) When in the LCO 3.7.10c configuration this ACTION has already been implemented*
>
> The non-essential loads have already been isolated as part of Configuration "c" applicability requirements.

Inoperability of One Chilled Water Pump

The inoperability of one chilled water pump requires restoration of the inoperable pump within 7 days or the plant to be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours per ACTION c. This ACTION is applicable to both Units per the new proposed Note 3 (shown in Attachment 1 Section 2.0 of the LAR and in the TS Markup (Attachment 2):

> *(3) When in the LCO 3.7.10c configuration ACTIONs are applicable for both Units*

Inoperability of Two Required Chillers

Two new proposed notes (shown in Attachment 1 Section 2.0 of the LAR) and the TS Markup (Attachment 2) provide the required actions if Configuration 'c' is no longer met:

New Note 3 requires that ACTIONS are applicable to both Units when in Configuration "c":

> *(3) When in the LCO 3.7.10c configuration ACTIONs are applicable for both Units*

New Note 6 on ACTION (b) requires shutdown if in Configuration "c" (cross-tied) and if two of the required chillers become inoperable:

> *(6) When in the LCO 3.7.10c configuration, proceed directly to Action b.4*

Action b.4 requires Unit shutdown; HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Consequently, new Notes (3) and (6) will require both Units to shutdown on loss of two chillers when cross-tied (Configuration "c"). These two notes eliminate the 72 hour restoration time allowance for Configuration "c".

As stated above, for proposed LCO 3.7.10c, if one chiller is inoperable on the unit providing chilled water, a completion time of 14 days is proposed, which is consistent with the existing TS 3/4.7.10. The calculations in support of the cross-tied configuration were performed with two chillers operating. This supports the proposed completion time of 14 days.

As stated above, for proposed LCO 3.7.10c, with two chillers inoperable on the unit providing chilled water in MODES 1, 2, 3, and 4, the completion time of 72 hours is eliminated and replaced with the requirement for both units to be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Proposed Note 6 bypasses the 72-hour completion time.

For proposed LCO 3.7.10c, with two chillers inoperable on the unit providing chilled water in MODES 5 and 6 or during movements of irradiated fuel assemblies, the completion time of

72 hours is replaced with suspend CORE ALTERATIONS and movement of irradiated fuel assemblies. Proposed Note 6 bypasses the previous 72-hour completion time.

The NRC staff finds that these proposed changes place the units in a safe condition if LCO 3.7.10c cannot be met and, therefore, the changes are acceptable.

3.5.2.5 Cross-Tied Configuration – Maintenance Rule

The proposed cross-tied configuration allows the three chillers from one unit to support the heat loads of both units. The maintenance rule regulation is referenced in the Salem UFSAR, including the requirements of 10 CFR 50.65(a)(4), which involve on-line risk assessment. 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.

In its letter dated March 31, 2016, PSEG describes the risk assessment (10 CFR 50.65(a)(4)) for each unit when in the cross-tied configuration (related to core damage frequency and large early release frequency) and Salem's program related to protected equipment. Specifically, the licensee stated:

> ... The on-line risk assessment is a blended approach using qualitative or defense-in-depth considerations and quantifiable PRA risk insights when available to complement the qualitative assessment. Salem communicates on-line plant risk using three risk tiers (GREEN, YELLOW, and RED). The on-line risk level for both Salem Units will be elevated to YELLOW when using the chilled water cross-tie. The YELLOW declaration will alert station personnel that the operational configuration causes an elevated risk condition acceptable for the scheduled maintenance duration. This elevated risk can be managed by reducing equipment outage time and implementing compensatory measures. The primary compensatory measures are to protect equipment necessary to maintain the chilled water function for both Units. This equipment includes all three chillers and both chilled water pumps. The emergency diesel generators (EDG) that provide backup electrical power to the vital AC buses will also be protected to ensure availability of all three chillers if a loss of offsite power (LOOP) occurs. For configurations of this nature, it is common practice to protect the general areas of the plant that contain the chiller and control area ventilation equipment. However, that determination has not been finalized for the new TS configurations.
>
> Protecting equipment requires posting of signs and robust barriers to alert personnel not to approach the protected equipment. The protected equipment postings are walked down each shift by the duty operators. Work on protected equipment is generally disallowed. Minor exceptions exist for activities such as Operator rounds, security patrols, or emergency operations. Other exceptions must be authorized by the station shift manager in writing. Inadvertent operation will be prevented by the protected equipment program.

> ...Outage risk assessments are purely a qualitative analysis representing defense-in-depth. Use of the chilled water cross-tie in outage risk assessment models is not currently credited but may be implemented to support future outage activities. The risk level is likely to be elevated, and the compensatory protected equipment measures will be similar as for on-line operation.

In accordance with procedure, PSEG will assess the need to include the chiller cross-tie configuration to the PRA full power model following issuance of these amendments. When placing the chiller cross-tie into service, the on-line risk and shutdown risk will be evaluated, and all necessary protective equipment (e.g., chillers, chilled water pumps, and EDGs) will be evaluated in accordance with the risk and defense-in depth processes. The NRC staff finds this approach acceptable.

3.5.3 Heat Loads and Temperature Margins

By letter dated July 14, 2016,[9] the NRC staff asked PSEG to describe the normal and accident design heat loads, with temperature margins, for the two chiller and cross-tied configurations during the applicable timeframe (November 1 to April 30 conditions).

In its August 12, 2016, response, the licensee stated, in part, that:

> Operation of the Chilled Water system in the Cross-tied and Two Chiller configurations result in fewer available chillers and higher heat loads per chiller. Using the previous method of evaluating the Chilled Water System based directly on chiller margin is not sufficient to demonstrate acceptable operation during Cross-tied Operations and Two Chiller Operations since the heat load on the chillers exceeds the design basis chiller capacity of 60 tons (for 44 °F Chilled Water temperature and 93 °F Service Water temperature). As shown in Calculation S-C-CH-MDC-2282, chiller capacity increases with increasing Chilled Water temperature. When the system heat load demand exceeds the chiller capacity at 44°F, the Chilled Water temperature will increase until the heat load demand equals the chiller capacity. Calculation S-C-CAV-MDC-2320 determines the corresponding chiller outlet temperature where the chiller capacity matches the heat load demand on the system. This equilibrium chiller outlet temperature is determined for each case.
>
> Therefore, evaluating the chiller capacity margin is not a meaningful parameter when assessing chiller performance during Cross-tied Operations and Two Chiller Operations. Calculation S-C-CAV-MDC-2320 evaluates the associated room temperatures which represents the integrated effect of all the various margins, as discussed as part of the response to question subpart c below.
>
> ...

[9] ADAMS Accession No. ML16195A449

c. Calculation S-C-CAV-MDC-2320 evaluates the temperatures in the Control Area for the Cross-tied and Two Chiller configurations. The calculation has room temperature criteria ranging from 76 °F to 85 °F. The lowest margin to the acceptance criteria in Calculation S-C-CAV-MDC-2320 is 0.2 °F. The temperature acceptance criteria are based on personnel comfort. Exceeding these criteria would not result in damage to plant equipment.

   The temperature margin to equipment failure during Cross-tied Operation or Two Chiller Operation is based on the design basis temperatures for the equipment in the various rooms in the Control Area. When equipment requirements are taken into consideration, the temperature margin is at least 26.7°F.

As stated above, PSEG calculation results indicate that there is adequate temperature margin for equipment as shown in the table below. The table, compiled from information contained in the September 11, 2015, LAR, shows the maximum calculated temperature in the respective rooms for normal, accident, and maintenance modes (for either configuration). The NRC staff finds that, based on the conservatism used in various calculations (heat loads, SW flows, chiller water flows, and chiller capacity) and the resulting calculated margins obtained, this approach is acceptable, and that there is adequate margin for two chiller and cross-tied operation.

Temperature margins by room during cross-tie operations or two chiller operations:

Area	Calculated Temperatures	Equipment Design Temperature	Equipment Temperature Margin
Main Control Room	83.3 °F	110 °F	26.7 °F
Electrical Equipment Room (EER)	75.6 °F	120 °F	44.4 °F
Control Area Relay Room (CARR)	75.8 °F	122 °F	46.2 °F

3.5.4 AB CH Expansion Tank

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, the letter contains an FMEA, which included the potable water and nitrogen system. Proposed TS 3/4.7.10b, item 4c, and proposed TS 3/4.7.10c, item 3, require that non-essential heat loads are isolated from the chilled water system on both units. Proposed TS 3/4.7.10 SRs have similar statements regarding non-essential heat loads being isolated from the chilled water system.

SRP Section 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 cross-tied configuration, only one expansion tank will be aligned for dual unit operations.

In its March 31, 2016, letter, PSEG stated, in part, that:

a. ... The unusable volume is 25 gallons, yielding a net usable volume of 138-205 gallons per tank. At the low level alarm setpoint (26.4%), the nominal volume is 100 gallons, or a net usable volume of 75 gallons per tank.

...

Currently, the Unit 1 and Unit 2 automatic makeup capabilities of the chilled water expansion tanks are not operational. This is due to previously identified in-leakage past the automatic makeup valve causing expansion tank level to rise, upon which the makeup lines were manually isolated. Operations monitors expansion tank level once per shift and performs makeups of the tank as required per Operator Logs and procedure S1(2).0P-AR.ZZ-0018, Auxiliary Annunciator Alarm List. Makeup to the expansion tank is not typically required unless to support fill and vent of the system following maintenance.

Measurement of system leakage for both the Unit 1 and Unit 2 CH systems was performed under a troubleshooting activity in 2008 and found zero leakage on both Units.

Recent trend data of expansion tank level generally finds no evidence of leakage, i.e. the level remains constant. Per review of historical data, the chilled water expansion tank level may typically vary by 5% from week to week. ...

However, assuming this 5% variation in expansion tank level is real, a conservative estimate for chilled water inventory loss may be made. On 10/05/2015, Unit 1 chilled water expansion tank level was estimated at 70% level. On 10/19/2015, Unit 1 chilled water expansion tank level was estimated at 65% level. This 5% variation in expansion tank level corresponds to approximately a 14 gallon loss. Over the 14 day period observed, this corresponds to a potential 1 gallon/day loss of inventory, or 7 gallons/week.

From Item a, the tank is maintained at a minimum level of 50%, which equates to 138 gallon usable volume. At the low level alarm (26.4%), the usable volume is 75 gallons. Even if it is conservatively assumed the tank drops to this level, there would still be sufficient inventory to mitigate leakage for 7 days.

If tank level is found below 50%, additional potable water is added. At a 7 gallons/week leak rate, the level would be expected to drop from 50% to 26.4% after 9 weeks. Leakage rates of this amount would be effectively mitigated by once per shift monitoring, meaning the low level alarm would never be reached.

c-e. Based on the normal operation leakage discussed [above], the expected leakage during off-normal alignments, including accident and LOOP, Two Chiller

> (LCO 3.7.10b configuration) and Cross-Tied (LCO 3.7.10c configuration), will be minimal.

In addition, PSEG stated:

> When initially aligned in the Cross-Tied configuration (1CH63 and 1CH78 valves open), the following will be performed to verify system leakage:
>
> 1. Monitoring of the chilled water expansion tank level for each Unit over a period of time to quantify actual system leakage, similar to the manner performed in 2008. Duration of monitoring to be determined during the planning process.
>
> 2. A walk-down of the in-service chilled water system piping to verify no additional leaks developed following change in alignment.

As described above, the historical data on the two chilled water expansion tanks indicates little to no leakage. Currently, automatic water makeup to the expansion tanks is unavailable, and water makeup to the two expansion tanks it not typically required unless it is to support fill and vent of the system following maintenance. Operators will add water to the expansion tanks at levels found below 50 percent. Once the chillers are initially placed into the cross-tied configuration, the licensee will verify system leakage. System leakage in the proposed two chiller configuration is not expected to exceed the leakage in the current TS configuration, which the licensee has indicated to be minimal.

Based on the above, the current method in place for makeup will maintain adequate expansion tank levels and, therefore, the NRC staff finds the expansion tanks acceptable to support two chiller and cross-tied configurations.

3.5.5 Isolation of Non-Essential Loads

PSEG stated in the September 11, 2015, LAR that non-essential heat loads are isolated from the chilled water system on both units while in the two chiller configuration and the cross-tied configuration. Proposed TS 3/4.7.10 SRs have a similar statement regarding the isolation of nonessential heat loads. By letter dated March 31, 2016, the licensee provided the specific valve numbers that isolate the Salem, Unit Nos. 1 and 2, PCAUs, Unit 1 Secondary Lab Coolers (SLC), Unit 1 Primary Lab Coolers (PLC), Unit 2 Counting Room Coolers (CLC) and Post Accident Sampling Room Coolers (PASRC), and Unit 1 and Unit 2 ECACs. PSEG also provided the design leakage rates for the valves and concluded that the leakage rate for manual valves equates essentially to zero leakage.

PSEG also stated that there is no additional testing required to validate the boundary valve assumed leakage and that no design or operational changes are required to the expansion tank and potable water makeup flow rates.

Guidance for isolating non-essential heat loads is currently contained in licensee procedures. PSEG stated that the applicable procedure will be updated during the implementation of these amendments to reflect the two chiller and cross-tied configurations.

As stated above, PSEG has accounted for potential valve/boundary leakage and has committed to revising operational procedures to control required boundary isolations. As previously stated above, the two chiller system expansion tank levels will be monitored and maintained. The NRC staff finds this acceptable.

3.5.6 Post Chiller Replacement and Contiguous Days

PSEG stated in the September 11, 2015, LAR that the purpose of the two chiller configuration is to allow for chiller replacement. Over a period of time, all three safety-related chillers on Unit No. 1, and all three safety-related chillers on Unit No. 2 are planned to be replaced. By letter dated February 17, 2016, the NRC staff requested an explanation of why the proposed two chiller configuration is needed for the life of the plant.

In its March 31, 2016, response, the licensee stated:

> While the more urgent need for the LCO 3.7.10b configuration is to support the replacement of the chillers, the justification for the LCO 3.7.10b configuration was not based on a limited use analysis using probabilistic assumptions. The analysis/justification is deterministic based, and demonstrates that with the cooler temperature calendar window and the heat load that needs to be removed from the CH system, the number of required chillers is less (two vs three, considering a single failure).
>
> The new proposed configurations (LCO 3.7.10b and LCO 3.7.10c) have significant restrictions that must be met, as outlined in the proposed applicability sections of the LCOs. Because of these restrictions, the new LCO 3.7.10b and 3.7.10c configurations will be used judiciously. From an operational standpoint, it is preferred to remain in the original LCO 3.7.10a configuration whenever possible and practical (i.e., less likelihood that a Unit, or both Units, would need to make an unplanned transition out of the LCO, or even shutdown).
>
> ... This allows not only the chiller replacements but also additional operational flexibility during the cooler months of the year.... Having this flexibility reduces the possibility of PSEG having to request enforcement discretion in the future for the AB CH system.
>
> ... The LCO 3.7.10b configuration will initially be used to support the chiller replacements; however, use for other operating reasons is not restricted by the analysis supporting the LCO configuration.

In addition, by letter dated August 12, 2016, PSEG clarified its intention of using the two chiller and cross-tied configurations for chiller replacement, planned maintenance evolutions, and unplanned operational issues. PSEG added an applicability statement to both configurations limiting the number of contiguous days Salem can be in each configuration. Specifically, PSEG stated:

LCO Configuration b

...

Maintaining the LCO 3.7.10b configuration in the Salem Unit 1 and 2 Technical Specifications following the planned chiller replacements would allow for planned maintenance on the chillers to be scheduled during the cooler months when chiller capacity requirements are reduced, allowing for chiller maintenance without having reduced system availability by being in an ACTION statement if all three chillers are always required. This would allow operations, maintenance and engineering to schedule the chiller work windows based on the work necessary to ensure long term reliability of the chillers in the future without the work window restrictions of an action statement. By current work management practices, scheduled work windows involving a TS component are targeted not to exceed 50% of the TS allowed outage time. Allowing for an expanded work window will allow for the necessary preventative maintenance work to be performed potentially in one work window instead of taking the chiller out of service for multiple windows during the operating cycle to complete the work.

In addition to improvements in the planning of work for scheduled maintenance, the LCO 3.7.10b configuration would improve the overall plant risk in response to emergent chiller issues in the future. In the event that emergent chiller maintenance challenges the LCO 3.7.10a 14-day allowed outage time (AOT) following the chiller replacement, it would be a prudent action to retain LCO 3.7.10b in lieu of putting a plant through an unnecessary shutdown transient. Since the deterministic analysis discussed above has demonstrated that during the period of November 1 through April 30, the chilled water system can function in response to a design basis accident and withstand an active single failure, there is no additional nuclear safety risk to being in the LCO 3.7.10b configuration.

...

As discussed during the NRC on-site audit, PSEG recognizes that the currently proposed LCO 3.7.10b configuration would allow entry starting on November 1 and exit on April 30 (i.e., 180 days) with no restriction on how long the plant can stay in this configuration. However, as discussed in the response to RAI-SBPB-12[1], there are significant operational restrictions that come with LCO 3.7.10b configuration (limitations on CREACS single train alignment) which would limit the time duration based on the operational risk. To further clarify the judicious use of the LCO 3.7.10b configuration, PSEG is proposing to further restrict the use of LCO 3.7.10b to a 60-day contiguous period....

The 60-day contiguous period will be added as a note to the applicability of the LCO 3.7.10b configuration. This note will clarify that the 60-day contiguous period would not apply to the LCO 3.7.10b configuration entries for the replacement of the existing chillers. The revised TS markup is provided in the response to RAI-STSB-3, and Attachment 2 of this submittal.

The 60-day period would allow sufficient (bounding) time to perform emergent equipment repairs including the potential replacement of major components of the new chiller. This time period would allow for the procurement of the necessary parts if they are not in stock.

LCO Configuration c

...

The justification for the LCO 3.7.10c configuration was not based on a limited use analysis using probabilistic assumptions. The analysis/justification is deterministic based, and demonstrates that with the cooler temperature calendar window and the removal of heat loads from the chilled water system, a single unit's chillers and pumps can supply the chilled water heat removal requirements for both Units while accommodating an active single failure and a design basis accident on either Unit.

In the event that an operational issue arose that would impact the operability of Unit's chilled water system (i.e., leakage from an ASME boundary on a common line component), if it is determined that the operational issue could be repaired while using the chilled water cross-tie (i.e., the affected portion of the system can be isolated without impacting the function of the cross-tie), PSEG could transition to LCO 3.7.10c in lieu of putting a plant through an unnecessary shutdown transient without chilled water.

As discussed during the NRC on-site audit, PSEG recognizes that the currently proposed LCO 3.7.10c configuration would allow entry starting on November 1 and exit on April 30 (i.e., 180 days) with no restriction on how long the plant can stay in this configuration. However, as discussed in the response to RAI-SBPB-12, there are significant operational restrictions that come with LCO 3.7.10c configuration (both CREACS trains must be OPERABLE) which would limit the time duration based on the operational risk. To further clarify the judicious use of the LCO 3.7.10c configuration, PSEG is proposing to further restrict the use of LCO 3.7.10c to a 45-day contiguous period (this is similarly not an ACTION Statement AOT as discussed above for LCO 3.7.10b configuration). The 45-day contiguous period would allow for the tagging, maintenance, post maintenance testing, and restoration from the cross-tie configuration. The 45-day contiguous period will be added as a note to the applicability of the LCO 3.7.10c configuration.

As stated above, PSEG clarified that the new LCO configurations are intended and analyzed to be used for unplanned operational issues and planned maintenance evolutions, in addition to chiller replacement. PSEG will restrict the number of contiguous days while in the two chiller configuration (60 days) and the cross-tied configuration (45 days). The chiller replacement is exempted from the 60-day restriction. The 60 and 45 contiguous days are justified, realistic, and in alignment with station goals to limit work activities not to exceed 50 percent of the allowed outage time. The NRC staff finds that the use of the two chiller and the cross-tied configurations

for unplanned operational issues and planned maintenance evolutions, with the discussed restrictions, is acceptable.

3.5.7 Transitioning Between Chiller Configuration- Administrative Controls

PSEG stated in the September 11, 2015, LAR that, to transition from one chiller configuration to another, 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

PSEG provided a justification for the use of these administrative controls in its letter dated March 31, 2016:

a. Bypassing/removing automatic chiller functions is not currently required when removing or placing chillers in service; it is not anticipated this will be required for cross-tie operations. The change in system alignment due to transitioning between TS configurations will initially change CH flow through the chillers, then eventually the CH return temperature (chiller inlet). The chiller controls will adjust accordingly to the changing conditions, and the thermal performance will reach a new steady-state condition.

b. Required controls to prevent equipment damage during transition from cross-tie open to cross-tie closed while maintaining the CH system operable will be established via procedural guidance developed during the implementation of the LAR.

As state above, procedural controls will be in place during transitions between configurations to prevent equipment damage, and automatic chiller functions will remain operable during configuration transitions. Similar circumstances currently exist per Salem TS 3.0.6 when equipment removed to comply with ACTIONS is being restored. Currently, return to service administrative controls are managed by procedures. In addition, the TSs do not prescribe limits for use of "administrative controls." The NRC staff finds the use of administrative controls to transition from one configuration to another consistent with the current Salem TSs and, therefore, acceptable.

3.5.8 Chiller Flow Alignment

Manual valves are installed on the inlet and outlet of each chiller in the AB CH system. For the two chiller configuration, 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.

For the cross-tied configuration, LAR Table 4-13, "Limitations and Required Configuration for AB CH System 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.

In its March 31, 2016, letter, PSEG described the flow alignment through the operable chillers during normal and accident conditions. In addition, PSEG described flow alignment during normal and accident conditions if one chiller trips and any operator actions, and associated time limits, required to isolate AB CH water flow through the tripped chillers. More specifically, PSEG stated:

> Normally AB CH flows through all three chillers regardless if they are running or not. Manual isolation valves CH22 and CH27 (inlet and outlet, respectively) are available to secure flow to the chillers when out of service. Currently flow is not secured when a chiller is removed from service (i.e., for LCO configuration "a"). For Two Chiller Operation (LCO configuration "b") during normal operation, CH22 or CH27 will be closed to secure AB CH flow for the chiller removed from service. During Cross-Tied Operation (LCO configuration "c"), AB CH flows through all three chillers during normal operation.
>
> During an accident, the chiller flow configuration remains the same for its respective Technical Specification configuration. If a chiller trips due to a single failure during an accident, or for any other reason, there is no automatic action or credited operator action to secure AB CH flow to that chiller. This results in warm AB CH water passing through the non-operating chiller mixing with the chilled water from other chillers increasing the average AB CH supply temperature. The methodology used to calculate the final CH supply temperature is provided in Appendix A and B of S-C-CAV-MDC-2320 for Cross-Tied Operation and Two Chiller Operation, respectively.

As described above, normally chilled water flows through all three unit chillers regardless of whether they are running or not. During an accident, the chiller flow configuration remains the same as for its respective TS configuration. If a chiller trips due to a single failure during an accident, or for any other reason, there is no automatic action or credited operator action to secure chilled water flow to that chiller. Calculations account for any chiller bypass and warm water that mixes with the colder chiller water. In two chiller configuration, chiller bypass flow for the one chiller that is not required to be operable will be bypassed. In the cross-tied configuration, there will be flow through all three chillers in the unit that is supplying chilled water during both normal and accident conditions, including a trip of any chiller. Flow through the remaining unit chillers is isolated in the cross-tied configuration. The NRC staff finds that this flow alignment through the chillers during normal and accident conditions is acceptable.

3.5.9 Technical Specifications Evaluation

3.5.9.1 TS 3/4.7.10, "Chilled Water System – Auxiliary Building Subsystem"

The LCO will be revised to include three allowable configurations. The existing configuration remains unchanged with a new designation 3.7.10a. The two new configurations are designated as 3.7.10b (two operable chillers and two operable chilled water pumps) and 3.7.10c (three operable chillers and two operable chilled water pumps on one unit supplying chilled water to both units through the cross-tie). The three LCO configurations are provided in a tabular format containing system and component status/lineup requirements for Configurations 3.7.10b and 3.7.10c in the applicability statement. Typically, information in the applicability statement is restricted to the MODE of the plant or status of fuel movement. System and component status/lineup requirements are generally placed in the ACTION section of the TSs for conditions when the LCO is not met. By letter dated February 17, 2016, The NRC staff requested that PSEG discuss and justify the proposed TS format.

In its March 31, 2016, response, the licensee stated:

> 10 CFR 50.36 establishes that TS are required to have LCOs (50.36(c)(2)) and Surveillance Requirements (50.36(c)(3)). 10 CFR 50.36 does not define format, proscribe format, or provide any requirements concerning applicability and actions.
>
> ...
>
> Concerning 10 CFR 50.36(c)(3) (SRs); Salem Operations has reviewed the proposed format and has determined it provides the most clarity. The existing SRs 4.7.10a, 4.7.10b and 4.10c remain applicable to the existing LCO 3.7.10a configuration and the new LCO 3.7.10b and c configurations.
>
> ...
>
> With three LCO configurations it was not optimal to list them sequentially (horizontally) on the page; it was difficult for the Operators to see the relationship between the three. By placing the LCOs in the table format Operations can readily understand the restrictions and requirements when transitioning from one

> LCO to another. This proposed tiered LCO is equivalent in concept (i.e. a choice in the way the LCO can be satisfied), and similar in format (albeit vertically depicted in a table for better Operator understanding versus horizontally listed) to examples in the current Salem TS (NUREG-0452 based) and in Improved Standard TS (NUREG-1431)...

Since the proposed TS 3/4.7.10 table is complex and deviates from the NUREG-1431 format, the proposed format was generated with input from control room staff for ease of usage and clarity. In addition, PSEG will conduct formal training to all control room staff prior to use of the proposed TS changes. The NRC staff determined that the system and component lineup requirements for the two new configurations are consistent with the deterministic analyses/evaluations performed by PSEG in support of the proposed changes. Based on the input from the Salem operators and the formal training that will be provided, the NRC staff finds that the proposed format is acceptable.

In addition, the NRC staff identified that the proposed TS table contains a row titled "CONFIGURATION." Typically, a word with all letters capitalized signifies a term with a definition in Section 1.0 of the Salem TSs. The NRC staff, in its letter dated July 14, 2016, requested PSEG to address the deviation from typical Salem TS format and terminology or provide an alternate TS table title and corresponding proposed changes to the LCO and footnotes.

In its August 12, 2016, response, the licensee stated that, "The term 'Configuration' has been retained (in lower case)." The staff finds this acceptable since the term 'configuration' was changed to lower case to be consistent with the Salem TSs.

In addition, the proposed format and text for Item 4 in the TS 3/4.7.10b applicability statement was not clear and appeared to be a list of items that must be met, rather than a list of items that is required only for CREACS single filtration train alignment. By letter dated July 14, 2016, the NRC staff requested PSEG to provide justification for the proposed format and text or provide an alternate format and text to clarify the items.

In response, PSEG stated that the applicability wording had been revised to clarify the restrictions when CREACS is in either two train or single train filtration alignment. The NRC staff finds that the revised wording clarifies the restrictions and is, therefore, acceptable.

PSEG stated in the September 11, 2015, LAR that, while in the two chiller or cross-tied configurations, certain conditions must be met. By letter dated February 17, 2016, the NRC staff asked PSEG to describe all combinations of actions that will be taken when the applicability conditions can no longer be satisfied.

In its March 31, 2016, response, the licensee stated:

> If the applicability conditions of the LCO 3.7.10b or LCO 3.7.10c configurations can no longer be met once the LCO has been entered then the LCO must be exited. If the Unit cannot transition to one of the other LCO configurations, then TS 3.0.3 becomes applicable (Shutdown actions). This applies for all of the applicability conditions of the LCO 3.7.10b and LCO 3.7.10c configurations.

As stated above, either the ACTION statement is entered or the LCO configuration must be exited. If the unit cannot transition to another LCO configuration, TS 3.0.3 is applicable. The NRC staff finds that these actions are acceptable.

The new Notes (1) through (6) provide clarity and are consistent with the responses provided by PSEG to various NRC staff RAIs. In some cases, PSEG responses to the NRC staff RAIs resulted in changes to the proposed TSs in the LAR. The proposed changes listed in Section 3.3 of this SE are inclusive of the changes originally proposed in the LAR and any later modifications proposed in PSEG's supplemental letters. The note designated as "#" stating that the LCO 3.7.10b configuration may only be used for periods of 60 contiguous days, with the exception that it does not apply for the LCO entry to support the replacement of all six original chillers, provides assurance that the entry into the LCO is not excessive and will not be used for operational conveniences. A similar note designated as "##," states that the LCO 3.7.10c configuration may only be used for periods of 45 contiguous days. The NRC staff finds that the proposed notes are acceptable.

The applicability of action statements "a" and "b" currently read as, "With one chiller inoperable," and, "With two chillers inoperable," respectively, in "MODES 1, 2, 3, and 4" and "MODES 5 and 6 or during movement of irradiated fuel assemblies." With the proposed changes, these statements will read as, "With one of the required chillers inoperable," and, "With two of the required chillers inoperable." These changes are appropriate because the required number of chillers and their source units could be different at any time under the proposed changes.

An existing note applicable to the ACTION applicable to "MODES 5 and 6 or during movement of irradiated fuel assemblies" states, "During Modes 5 and 6 and during movement of irradiated assemblies, chilled water components are not considered solely on the basis that the backup emergency power source, diesel generator, is inoperable." PSEG proposed to add a disclaimer to this note stating, "This is not applicable to the LCO 3.7.10c configuration." The existing ACTION is based on the consideration that three operable chillers on each unit are always required. The flexibility offered by the existing note is excluded by the proposed change during LCO 3.7.10c because it recognizes that the number of required operable chillers is lower during this configuration and that all the required chillers are from a single unit.

The addition of SR 4.7.10.d and SR 4.7.10.e to verify the equipment lineup "once per 24 hours" when in LCO 3.7.10b and LCO 3.7.10c configurations provides assurance that the lineup remains as analyzed in the deterministic evaluations. The additional surveillances are appropriate considering the reduced number of operable chillers available in these configurations, compared to the current TS configuration.

NUREG-0452 and NUREG-1431 represent the evolution of the NRC staff's guidance on how to meet 10 CFR 50.36 for Westinghouse plants. Licensees can deviate/depart from staff guidance as long as they provide acceptable justification. The staff has determined that the proposed TSs deviate/depart from the guidance of NUREG-1431. The licensee provided justification for the deviations and departures from NUREG-0452 and NUREG-1431. The staff evaluated the justifications and determined that they were acceptable. Therefore, the NRC staff finds that the proposed TSs meet the regulatory requirements of 10 CFR 50.36.

3.5.9.2 TS 3/4.7.6, "Control Room Emergency Air Conditioning System"

Action statements "a" for "MODES 1, 2, 3, and 4" and "MODES 5 and 6 or during movement of irradiated fuel assemblies" address CREACS single filtration train alignment when one filtration train becomes inoperable. A proposed note designated as "**" will state that, "Alignment only permitted if the Unit with the operable CREACS train is also in Chilled Water System LCO 3.7.10a configuration. Alignment is not permitted if in the LCO 3.7.10c configuration."

The proposed note maintains consistency with deterministic evaluations performed by PSEG. The evaluations have concluded that LCO 3.7.10c is not capable of supporting a single filtration train alignment. Therefore, the NRC staff concludes that the addition of the proposed note is acceptable because it provides an important cross-reference to the limitation of LCO 3.7.10c to support single filtration train alignment.

3.6 <u>NRC Staff Summary</u>

The proposed TS changes to add two new configurations to TS 3/4.7.10 with associated new surveillances, and to add a new note to TS 3/4.7.6, meet regulatory requirements as described in Section 2.3 of this SE. Deterministic evaluations performed by the licensee for the proposed TS 3.7.10b and TS 3.7.10c configurations show that cooling to safety-related heat loads will continue to be met.

The intent of the new configurations to allow for chiller replacements, for performing maintenance, and for unplanned operational issues during the cooler months of the year is met by the supporting calculations and evaluations performed by the licensee. The staff finds reasonable assurance that adequate margin exists for operating in these new chiller configurations with the appropriate conditions applied (times of year, load isolations, alignments, and administrative controls).

The NRC staff finds the proposed license condition acceptable for the cross-tied configuration. The license condition captures the testing requirement to confirm the performance of the cross-tie prior to its first use. The license condition states:

> Concurrent with the first use of the chilled water cross-tie as allowed by Technical Specification 3.7.10c, PSEG shall confirm the required performance of the chilled water system cross-tie.

4.0 <u>STATE CONSULTATION</u>

In accordance with the Commission's regulations, the New Jersey State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 <u>ENVIRONMENTAL CONSIDERATION</u>

The amendments change a requirement with respect to installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 and changes SRs. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The

Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding published in the *Federal Register* on January 5, 2016 (81 FR 263). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. PSEG letter to NRC, "License Amendment Request Modifying Chilled Water System Requirements," dated September 11, 2015 (ADAMS Accession No. ML15254A387).

2. NRC letter to PSEG, "Salem Nuclear Generating Station, Unit Nos. 1 and 2 Supplemental Information Needed for Acceptance of Requested Licensing Action Re: Amendment Request Regarding Chilled Water System Modification," dated October 29, 2015 (ADAMS Accession No. ML15299A383).

3. PSEG letter to NRC, "Supplemental Information Needed for Acceptance of Requested Licensing Action Re: Amendment Request Regarding Chilled Water System Modification (CAC Nos. MF6724 and MF6725)," dated November 5, 2015 (ADAMS Accession No. ML15309A750).

4. NRC letter to PSEG, "Salem Nuclear Generating Station, Unit Nos. 1 and 2 Request for Additional Information Regarding Chilled Water System Modifications," dated February 17, 2016 (ADAMS Accession No. ML16013A159).

5. PSEG letter to NRC, "Response to Request for Additional Information Regarding Chilled Water System Modification (CAC Nos. MF6724 and MF6725)," dated March 31, 2016 (ADAMS Accession No. ML16091A237).

6. NRC letter to PSEG, "Salem Nuclear Generating Station, Unit Nos. 1 and 2 Request for Additional Information Regarding Chilled Water System Modifications," dated July 14, 2016 (ADAMS Accession No. ML16195A449).

7. PSEG letter to NRC, Response to Request for Additional Information Regarding Chilled Water System Modification (CAC Nos. MF6724 and MF6725)," dated August 12, 2016 (ADAMS Accession No. ML16225A436).

8. PSEG letter to NRC, "Response to Request for Additional Information Regarding Chilled Water System Modification (CAC Nos. MF6724 and MF6725)," dated August 30, 2016 (ADAMS Accession No. ML16243A227).

9. NRC audit summary, "Salem Nuclear Generating Station Unit Nos. 1 and 2 - Regulatory Audit Summary Regarding License Amendment Request to Modify Chilled Water System Requirements (CAC Nos. MF6724 and MF6725),'" dated October 31, 2016 (ADAMS Accession No. ML16288A749).

Principal Contributors: L. Wheeler
N. Karipineni
M. Hamm

Date: November 2, 2016

November 2, 2016

Mr. Peter P. Sena, III
President
PSEG Nuclear LLC - N09
P.O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENTS RE: CHILLED WATER SYSTEM MODIFICATION (CAC NOS. MF6724 AND MF6725)

Dear Mr. Sena:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 316 and 297 to Renewed Facility Operating License Nos. DPR-70 and DPR-75 for Salem Nuclear Generating Station, Unit Nos. 1 and 2, respectively. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated September 11, 2015, as supplemented by letters dated November 5, 2015; March 31, 2016; August 12, 2016; and August 30, 2016.

The amendments revise the TSs to support planned plant modifications to implement chiller replacements, for performing maintenance, and for unplanned operational issues.

A copy of our Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

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

Enclosures:
1. Amendment No. 316 to Renewed DPR-70
2. Amendment No. 297 to Renewed DPR-75
3. Safety Evaluation

cc w/enclosures: Distribution via Listserv

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NAME	CParker	LRonewicz	AKlein	RDennig
DATE	10/11/16	10/11/16	10/14/16	9/7/2016
OFFICE	OGC NLO w/comments	DORL/LPL1-2/BC(A)	DORL/LPL1-2/PM	
NAME	JWachutka	SKoenick (DBroaddus for)	CParker	
DATE	10/25/16	11/01/16	11/02/16	

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