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

January 18, 2018

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

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENTS RE: CONTAINMENT FAN COIL UNIT ALLOWED OUTAGE TIME EXTENSION (CAC NOS. MF9364 AND MF9365; EPID L-2017-LLA-0212)

Dear Mr. Sena:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 321 and 302 to Renewed Facility Operating License Nos. DPR-70 and DPR-75 for the Salem Nuclear Generating Station, Unit Nos. 1 and 2, respectively. These amendments consist of changes to the Technical Specifications in response to your application dated March 6, 2017,[1] as supplemented by letters dated May 4, 2017,[2] and September 14, 2017.[3]

The amendments revise Technical Specification 3.6.2.3, "Containment Cooling System," to extend the containment fan coil unit allowed outage time from 7 days to 14 days for one or two inoperable containment fan coil units.

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

Sincerely,

Carleen J. Parker, Project Manager
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-272 and 50-311

Enclosures:
1. Amendment No. 321 to Renewed DPR-70
2. Amendment No. 302 to Renewed DPR-75
3. Safety Evaluation

cc w/Enclosures: Distribution via Listserv

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[1] Agencywide Documents Access and Management System (ADAMS) Accession No. ML17065A241
[2] ADAMS Accession No. ML17125A051
[3] ADAMS Accession No. ML17257A439

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 RENEWED FACILITY OPERATING LICENSE

Amendment No. 321
Renewed License No. DPR-70

1. The U.S. 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 March 6, 2017, as supplemented by letters dated May 4, 2017, and September 14, 2017, 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 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 paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-70 is hereby amended to read as follows:

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

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 321, 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. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael P. Marshall for

James G. Danna, Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility Operating
License and Technical Specifications

Date of Issuance: January 18, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 321

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

RENEWED FACILITY OPERATING LICENSE NO. DPR-70

DOCKET NO. 50-272

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

Remove	Insert
Page 3	Page 3

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

Remove	Insert
3/4 6-11	3/4 6-11

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. 321, 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

CONTAINMENT SYSTEMS

CONTAINMENT COOLING SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.2.3 Five containment cooling fans shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one or two of the above required containment cooling fans inoperable, restore the inoperable cooling fan(s) to OPERABLE status within 14 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With three or more of the above required containment cooling fans inoperable, restore at least three cooling fans to OPERABLE status within 1 hour or be in at least HOT STANDBY WITHIN the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the remaining inoperable cooling fans to OPERABLE status within 14 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.3 Each containment cooling fan shall be demonstrated OPERABLE:

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 RENEWED FACILITY OPERATING LICENSE

Amendment No. 302
Renewed License No. DPR-75

1. The U.S. 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 March 6, 2017, as supplemented by letters dated May 4, 2017, and September 14, 2017, 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 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 paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-75 is hereby amended to read as follows:

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

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 302, 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. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael L. Marshall, Jr. for

James G. Danna, Chief
Plant Licensing Branch I
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility Operating License and Technical Specifications

Date of Issuance: January 18, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 302

SALEM NUCLEAR GENERATING STATION, UNIT NO. 2

RENEWED FACILITY OPERATING LICENSE NO. DPR-75

DOCKET NO. 50-311

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

Remove	Insert
Page 3	Page 3

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

Remove	Insert
3/4 6-12	3/4 6-12

(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) Maximum Power Level

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

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 302, 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.

CONTAINMENT SYSTEMS

CONTAINMENT COOLING SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.2.3 Five containment cooling fans shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one or two of the above required containment cooling fans inoperable, restore the inoperable cooling fan(s) to OPERABLE status within 14 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With three or more of the above required containment cooling fans inoperable, restore at least three cooling fans to OPERABLE status within 1 hour or be in at least HOT STANDBY WITHIN the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the remaining inoperable cooling fans to OPERABLE status within 14 days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.3 Each containment cooling fan shall be demonstrated OPERABLE:

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 321 AND 302 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 March 6, 2017 (Reference 1), as supplemented by letters dated May 4, 2017, and September 14, 2017 (Reference 2 and Reference 3, respectively), 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 TS 3.6.2.3, "Containment Cooling System," to extend the containment fan cooling unit (CFCU) allowed outage time (AOT) from 7 days to 14 days for one or two inoperable CFCUs.

The supplement dated September 14, 2017, 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 June 6, 2017 (82 FR 26136).

2.0 REGULATORY EVALUATION

2.1 Description of the Containment Fan Cooling System

The containment fan cooing system is described in Section 6.2.2, "Containment Heat Removal Systems," of the Salem Updated Final Safety Analysis Report (UFSAR). Additionally, PSEG provided a detailed description in its March 6, 2017, letter. UFSAR Section 3.1 describes the containment heat removal system, which includes the CFCUs, as follows:

> The containment heat removal system consists of two subsystems, containment spray (two trains) and containment fan cooling units (five cooling coils). The two subsystems are separate, are operated independently, and are of different design principles, but perform a similar containment heat removal function. The containment heat removal system provides adequate margin for maintaining an

> acceptable post-accident containment atmospheric pressure and thereby meets the intent of [Salem Design Criterion 52].

The March 6, 2017, letter further describes the containment cooling system as follows:

> Containment cooling is an engineered safeguard system. CFCUs, along with Containment Spray, provide the design containment cooling function and depressurization during design bases loss of coolant accident (LOCA) and main steam line break (MSLB) conditions. Furthermore, the CFCUs provide mixing of the containment atmosphere, which supports the iodine removal function of the containment spray system.

Additionally, the March 6, 2017, letter provides information on the CFCUs, stating that each Salem unit has five CFCUs consisting of a motor, fan, motor heat exchanger, cooling coils, roughing filters, dampers, duct distribution system, instrumentation, and controls. Additionally, the licensee states that the containment fan cooling system is designed to maintain the containment atmosphere at less than or equal to 120 degrees Fahrenheit (°F) during normal operation. In the event of a LOCA, the system is designed to ensure that the containment pressure will not exceed its design value of 47 pounds per square inch gauge (psig) at 271 °F (100-percent relative humidity). Although the water in the core after a LOCA is quickly subcooled by the emergency core cooling system, the containment fan cooling system is designed on the conservative assumption that the core residual heat is released to the containment as steam. The system is actuated (in the post-accident mode) by a safety injection signal. The CFCUs continue to remove heat after the LOCA and reduce the containment pressure close to atmospheric within the first 24 hours.

Each fan is designed to supply a nominal 110,000 cubic feet per minute during normal (high speed) operation and 40,000 cubic feet during accident (low speed) operation. Each of the five fan cooler units is capable, taking into consideration tube fouling, of removing at least 44 x 10^6 British thermal units per hour (Btu/hr) under accident conditions. The heat transfer rate for three fan cooler units (132 x 10^6 Btu/hr) exceeds the analyzed value assumed in the analysis of containment pressure response to a spectrum of reactor coolant system (RCS) and steam line breaks described in the UFSAR. The CFCUs are powered from three separate vital (electrical) buses. This ensures that in the event of a single failure of a vital bus, the minimum number of CFCUs (three) required to maintain containment integrity would remain available during a design-basis event.

A minimum of 1,300 gallons per minute (gpm) of service (cooling) water is supplied to each CFCU during accident conditions. The design maximum river cooling water inlet temperature is 90 °F. In the event of a loss of offsite power, the service water (SW) pumps stop and are sequenced back on via the safeguards equipment controller logic. Two 15,000 gallon pressurized accumulators (10,000 gallon normal water volume) are connected to the CFCU supply headers. These normally isolated tanks are designed to be rapidly placed in service through fast opening isolation valves in order to keep the CFCU SW piping solid following a LOCA or MSLB concurrent with a loss of offsite power event prior to the restart of the SW pumps.

During environmental conditions (peak summer heat) when three CFCUs could be insufficient to maintain containment temperature less than 120 °F, CFCU maintenance is not normally scheduled to ensure TS 3.6.1.5 containment temperature limits will be maintained. This applies for both the existing TS AOT of 7 days and the proposed AOT of 14 days.

2.2 Proposed Changes to the Technical Specification

TS AOTs provide a limited time to restore equipment to operable status. The AOT represents a balance between the risk associated with continued plant operation with less than the required system or component redundancy and the risk associated with initiating a plant transient while transitioning the unit to a lower power state. Shutdown of the plant involves many plant operator activities and plant evolutions. These activities and evolutions provide challenges to plant equipment, opportunities for operator errors and increase the possibility of a plant trip.

The requested changes would revise TS 3.6.2.3 to extend the CFCU AOT from 7 days to 14 days for one or two inoperable CFCUs. The changes are shown below in **bold**.

3.6.2.3 Five containment cooling fans shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

a. With one or two of the above required containment cooling fans inoperable, restore the inoperable cooling fan(s) to OPERABLE status within **14** days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With three or more of the above required containment cooling fans inoperable, restore at least three cooling fans to OPERABLE status within 1 hour or be in at least HOT STANDBY WITHIN the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the remaining inoperable cooling fans to OPERABLE status within **14** days of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

The licensee states that increasing the AOT of the CFCUs from 7 days to 14 days should increase operational safety by allowing continued steady-state operation, and by avoiding additional operator activities and plant evolutions associated with plant shutdown. In addition, the increased AOT would reduce unnecessary operational burdens by increasing flexibility in the scheduling and performance of corrective and preventive maintenance, thus improving CFCU reliability and allowing better control and allocation of resources during unplanned maintenance. The increased flexibility and control would allow increased allocation of the plant personnel's time to more safety-significant aspects of plant operation.

2.3 Applicable Regulatory Requirements and Guidance

2.3.1 Regulatory Requirements

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

2.3.1.1 General Design Criteria

Salem was designed in accordance with the Atomic Industrial Forum General Design Criteria and the licensee's understanding of the intent of the Atomic Energy Commission 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 UFSAR, Section 3.1.3, which concludes, in part, that the Salem plant design conforms with the intent of the GDC, with the exceptions noted.

The NRC staff identified the following applicable requirements from the Salem UFSAR:

> <u>Criterion 38 - Reliability and Testability of Engineered Safety Features</u>
>
> All engineered safety features shall be designed to provide high functional reliability and ready testability. In determining the suitability of a facility for proposed site, the degree of reliance upon and acceptance of the inherent and engineered safety afforded by the systems, including engineered safety features, will be influenced by the known and the demonstrated performance capability and reliability of the systems, and by the extent to which the operability of such systems can be tested and inspected where appropriate during the life of the plant.
>
> <u>Criterion 49 - Containment Design Basis</u>
>
> The containment structure, including access openings and penetrations, and any necessary containment heat removal systems shall be designed so that the containment structure can accommodate without exceeding the design leakage rate the pressures and temperatures resulting from the largest credible energy release following a loss-of-coolant accident, including a considerable margin for effects from metal-water or other chemical reactions, that could occur as a consequence of failure of Emergency Core Cooling Systems.
>
> <u>Criterion 52 - Containment Heat Removal Systems</u>
>
> Where active Heat Removal Systems are needed under accident conditions to prevent exceeding containment design pressure, at least two systems, preferably of different principles, each with full capacity, shall be provided.

2.3.1.2 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) limiting conditions for operation (LCOs); (3) surveillance requirements; (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.

2.3.2 Regulatory Guidance

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

- Regulatory Guide (RG) 1.174, Revision 2, "An Approach for Using Probabilistic Risk Assessment in Risk-informed Decisions on Plant-Specific Changes to the Licensing Bases" (May 2011), describes an acceptable risk-informed approach specifically for assessing licensing bases. (Reference 4)

- RG 1.177, Revision 1, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications" (May 2011), describes an acceptable risk-informed approach for assessing proposed changes to TS AOTs. In addition, this RG provides risk acceptance guidelines for evaluating the results of such assessments. (Reference 5)

- RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (March 2009), describes one acceptable approach for determining whether the quality of the probabilistic risk assessment (PRA) models, in total or the parts that are used to support an application, is sufficient to provide confidence in the results such that the PRA models can be used in regulatory decisionmaking for light-water reactors. (Reference 6)

- Regulatory Issue Summary 2007-06 (March 2007), "Regulatory Guide 1.200 Implementation," describes how the NRC will implement its technical adequacy review of plant-specific PRAs used to support risk-informed licensing actions after the issuance of RG 1.200. (Reference 7)

3.0 TECHNICAL EVALUATION

RG 1.177 provides an acceptable risk-informed approach for assessing changes to TS AOTs. The staff's review focuses on whether the licensee's proposed change meets the following five key principles outlined in RG 1.177.

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption.

2. The proposed change is consistent with the defense-in-depth philosophy.

3. The proposed change maintains sufficient safety margins.

4. When the proposed changes result in an increase in core damage frequency (CDF) or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

5. The impact of the proposed changes should be monitored using performance measurement strategies.

3.1 Key Principle 1: Compliance with Current Regulations

The staff has reviewed the requirements of 10 CFR 50.36(c) and has concluded that the licensee's amendment request is in compliance with 10 CFR 50.36(c). Additionally, the NRC

staff has reviewed Salem's design criteria and determined that the applicable criteria will continue to be met. Therefore, the staff concludes that the licensee's license amendment request (LAR) is in compliance with existing regulations.

3.2 Key Principle 2: Defense-in-Depth

As outlined in RG 1.177, Section 2.2, "Traditional Engineering Considerations," defense-in-depth consists of the seven elements discussed below, and these elements can be used as guidelines for assessing a licensee's defense-in-depth philosophy:

3.2.1 Reasonable Balance

RG 1.177 states that a reasonable balance among prevention of core damage, prevention of containment failure, and consequence mitigation should be preserved. The licensee stated that the amendment request will result in no change to the current balance of these critical functions. The safety function of the CFCUs is to recirculate and cool the containment atmosphere in the event of a LOCA. There are a total of five CFCUs, and each CFCU is capable, taking into consideration tube fouling, of removing at least 44 x 10^6 Btu/hr from the containment atmosphere under accident conditions. The heat transfer rate of three CFCUs (132 x 10^6 Btu/hr) exceeds the analyzed value assumed in the design-basis analysis of containment pressure response to a spectrum of RCS and steam line breaks described in the Salem UFSAR. Increasing the AOT for one or two inoperable CFCUs from 7 to 14 days does not affect the ability of three CFCUs to meet the acceptance criteria of the specific design-basis accidents.

The licensee states that the balance between mitigation of core damage and containment failure is preserved in that the overall equipment reliability is expected to be improved, and over the long term, the licensee expects fewer emergent issues as a result of increased flexibility in planning and performing maintenance activities resulting from the extended AOT.

3.2.2 Programmatic Activities

RG 1.177 states that the over reliance on programmatic activities as compensatory measures associated with the change in the licensing basis should be avoided. PSEG stated there are no changes to the design or operation of the CFCUs associated with the proposed change. Containment fan coil units and their associated CFCU motor coolers are components that, when properly maintained, have proven to be reliable. The licensee stated that the maintenance frequency for opening and cleaning the CFCUs and the motor coolers is in accordance with Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment." (Reference 8).

3.2.3 System Redundancy, Independence, and Diversity

RG 1.177 states that system redundancy, independence, and diversity should be preserved commensurate with the expected frequency and consequences of challenges to the system. The licensee stated that the redundancy, independence, and diversity of the CFCUs remain unchallenged as a result of the proposed licensing action.

During a LOCA or MSLB, the CFCUs and containment spray system act in concert to ensure that the containment pressure remains below the design pressure of 47 psig. There are five CFCUs. The heat transfer rate of three CFCUs (132 x 10^6 Btu/hr) exceeds the analyzed value assumed in the design-basis analysis of containment pressure response to a spectrum of RCS

and steam line breaks described in the Salem UFSAR. The licensee stated that no additional compensatory actions would be taken upon the removal from service of one or two CFCUs beyond those taken for the current AOT. The licensee stated that its protected equipment program provides appropriate restrictions to preclude simultaneous equipment outages that would erode the principles of redundancy and diversity. The licensee's online work management process requires the risk of the scheduled online maintenance activity to be continuously evaluated based on current conditions, including power grid stability, weather, and plant status.

The licensee stated that the online 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. The licensee communicates online plant risk using three risk tiers (GREEN, YELLOW, and RED). The licensee's online risk assessment shows that the risk level for both Salem units will remain GREEN when two CFCUs are unavailable. If two CFCUs are unavailable, the remaining three CFCUs and a containment spray pump will be protected. Additionally, the emergency diesel generators will be protected.

The licensee stated that protecting equipment requires posting of signs and robust barriers in order 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.

3.2.4 Defenses Against Potential Common Cause Failures

Consistent with RG 1.177, defenses against potential common cause failures are maintained, and the potential for introduction of new common cause failure mechanisms is assessed. The licensee did not identify any common cause failure mechanisms for the CFCUs. There are no changes to the design or operation of the CFCUs associated with the proposed AOT. The licensee stated that existing measures to ensure the potential for common cause failures is minimized include periodic cleaning and inspection, routine preventive maintenance, and corrective action measures to evaluate extent of condition.

3.2.5 Independence of Physical Barriers

RG 1.177 states that independence of physical barriers should not be degraded. PSEG stated the physical barriers (fuel cladding, RCS, and containment) and their independence are maintained. The licensee stated that the proposed change maintains the required containment heat removal capacity and does not affect the integrity of the CFCUs as a barrier to limit leakage to the environment. The licensee stated that extending the AOT for one or two CFCUs does not affect the independence of the fuel cladding, RCS, or containment.

3.2.6 Defenses against Human Errors are Maintained

RG 1.177 states that defenses against human errors should be preserved. The licensee stated that operators and maintenance personnel are in the practice of utilizing human error prevention tools and will use existing plant procedures to remove CFCUs from service to effect repairs and then return them to service. The licensee stated that this request extends an existing AOT;

therefore, the methods and precautions required, which could affect human performance, are unaffected by the proposed license change.

3.2.7 Intent of Plant's Design Criteria is Maintained

Consistent with RG 1.177, the intent of Salem's design criteria should be maintained. PSEG stated the operation of the CFCUs is not altered by the proposed extension to the AOT. More specifically, the licensee stated that the ability of the remaining TS required CFCUs to mitigate the effects and consequences of an accident is not affected because no additional single failures are postulated while equipment is inoperable within the TS AOT.

3.2.8 NRC Staff Evaluation of Defense-in-Depth Philosophy

The NRC staff evaluated the seven defense-in-depth philosophies as described above by the licensee. The NRC finds that the proposed TS changes:

1. Do not degrade core damage prevention and do not have any effect upon containment failure. Consequence mitigation remains unchallenged. Credit is taken for only two CFCUs in the mixing effect of the containment atmosphere in the Salem dose analyses, and no new accidents or transients are introduced with the proposed change. Therefore, a reasonable balance among prevention of core damage, prevention of containment failure, and consequence mitigation is preserved.

2. The reliability of the CFCUs is not challenged by the proposed amendment, and no increase in programmatic activity is required to support the proposed change.

3. The licensee has a sufficient online risk and protected equipment programs that ensure the opposite trains of CFCU, emergency diesel generators, core spray, and penetration areas will not be affected by planned maintenance activities.

4. The operating environment and operating parameters for the CFCUs are unaffected, and no new common cause failure modes are created by the proposed TS change.

5. The physical barriers and their independence are maintained. The proposed change maintains the required containment heat removal capacity.

6. The proposed extension to the AOT does not require any new operator actions for the existing plant equipment or introduce the potential for new human errors.

7. The proposed change does not involve any physical change to the design of the CFCUs or supporting systems.

Therefore, the NRC staff finds that the proposed change is consistent with the defense-in-depth philosophy.

3.3 Key Principle 3: Safety Margins

Consistent with RG 1.177, the impact of the proposed change should be consistent with the principle that sufficient safety margins are maintained. The licensee stated that the design and operation of the CFCUs are not changed by the proposed increase in AOT for one or two

inoperable CFCUs. Therefore, the proposed change does not affect conformance with applicable codes and standards.

Additionally, the licensee stated that the safety analyses acceptance criteria in the Salem UFSAR are unaffected by the proposed change. Three CFCUs are sufficient for the mitigation of the design-basis accident, and only three CFCUs are utilized in the UFSAR Chapter 15 accident analyses. This minimum heat transfer capability is not diminished by the proposed license amendment. The licensee stated that the proposed change will not cause the plant to be operated outside its designed configuration, and both SW system flow and air flow are confirmed as a matter of normal routine surveillances. Therefore, safety margins are not impacted by the proposed change of AOT for one or two CFCUs out of service.

The NRC staff finds that Salem, Unit Nos. 1 and 2, remain in a condition for which they have already been analyzed when extending the AOT for one or two CFCUs inoperable in MODES 1-4. Therefore, sufficient safety margins are maintained.

3.4 Key Principle 4: Risk Impact

RG 1.177 outlines a three-tiered approach for evaluating the risk associated with a proposed change to a TS AOT:

- Tier 1 assesses the risk impact of the proposed change in accordance with acceptance guidelines consistent with the Commission's Safety Goal Policy Statement, as documented in RG 1.177. The Tier 1 assessment evaluates the impact of the proposed change on operational plant risk as represented by the change in core damage frequency (ΔCDF) and the change in large early release frequency (ΔLERF). Inaddition to operational plant risk, the Tier 1 assessment evaluates plant risk while equipment covered by the AOT change is out of service, as represented by the incremental conditional core damage probability (ICCDP) and the incremental conditional large early release probability (ICLERP). The Tier 1 assessment also addresses the quality of the licensee's plant-specific PRA model used to assess the change in risk.

- Tier 2 identifies and evaluates any potential risk-significant plant configurations that could result if any equipment, in addition to that associated with the proposed license amendment, is taken out of service simultaneously, or if other risk significant operational factors such as concurrent system or equipment testing are involved. The purpose of this evaluation is to ensure that there are appropriate restrictions on dominant risk-significant equipment configurations associated with the proposed change.

- Tier 3 addresses the licensee's overall configuration risk management program to ensure that the licensee has established adequate programs and procedures for identifying risk-significant plant configurations resulting from maintenance or other operational activities, and that appropriate compensatory measures are taken to avoid risk-significant configurations that may not have been considered in the Tier 2 evaluation. Compared with Tier 2, Tier 3 provides additional coverage to ensure that the licensee identifies, in a timely manner, any potentially risk-significant equipment outage configurations, and that the licensee evaluates appropriately the risk impact of out-of-service equipment prior to performing any maintenance activity over extended periods of plant operation.

3.4.1 Tier 1: PRA Quality and Insights

Following Tier 1 of the three-tiered approach outlined in RG 1.177, the licensee should evaluate the change in plant risk resulting from the TS AOT change as represented by the ΔCDF, ICCDP, ΔLERF, and ICLERP. To support this evaluation, two aspects should be considered: (1) the validity or quality of the PRA and (2) the PRA insights and findings. The licensee should demonstrate that its PRA is valid for assessing the proposed TS change and identify the impact of the TS change on plant risk.

3.4.1.1 PRA Quality

As outlined in Section 2.3 of RG 1.177, the quality of a PRA can be determined through an assessment of the scope of the PRA and the technical acceptability of the PRA, with particular attention given to PRA modeling and assumptions and sensitivity and uncertainty analyses.

3.4.1.1.1 Scope of the PRA

Section 2.3.2 of RG 1.177 states that, at a minimum, the licensee should perform evaluations of CDF and large early release frequency (LERF) to support any risk-informed changes to TSs. The scope of the analysis should include all hazard groups (i.e., internal events, internal flood, internal fires, seismic events, high winds, transportation events, and other external hazards). Section 2.3.1 of RG 1.174 states that a qualitative treatment of the missing modes and hazard groups may be sufficient when the licensee can demonstrate that those risk contributions would not affect the decision.

In support of this LAR, the licensee performed a quantitative evaluation of the change in risk resulting from the TS AOT change for at-power internal events and internal flooding. The licensee provided a qualitative evaluation of the change in risk for internal fires and seismic hazards using insights gained for the internal events and flooding PRA models. The review of the technical acceptability of the internal events and internal flooding PRA models and the acceptability of the qualitative evaluations are contained in Sections 3.4.1.1.2.1 and 3.4.1.1.2.2 of this evaluation, respectively.

The licensee stated that PSEG screened out the class of external events termed “other external events” (e.g., external flooding, extreme cold, transportation accidents, etc.). The licensee screened out the events either by compliance with the 1975 Standard Review Plan criteria or by bounding probabilistic analyses that demonstrated a core damage frequency of less than the individual plant external events examination screening criteria as contained in NUREG-1407, “Procedural and Submittal Guidance of the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities” (Reference 9). The screening criteria in NUREG-1407 is bounded by the screening criteria contained in the American Society of Mechanical Engineers (ASME)/American Nuclear Society (ANS) RA-Sa–2009, “Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications,” which is endorsed, with clarifications and exceptions, by the NRC in RG 1.200.

Based on the review of the licensee’s LAR, as supplemented, the NRC staff finds that, when compared to the guidance contained in RGs 1.174, 1.177, and 1.200, the licensee’s risk assessment is of sufficient scope for use in this specific risk-informed application.

3.4.1.1.2 Technical Acceptability of the PRA

RG 1.200 describes one acceptable approach for determining whether the technical acceptability of a PRA is sufficient for use in regulatory decisionmaking for light-water reactors. The purpose of RG 1.200 is to (a) provide guidance to licensees for use in determining the technical acceptability of the base PRA used in a risk-informed regulatory activity, and (b) endorse industry standards and peer review guidance. In March of 2009, the NRC issued Revision 2 of RG 1.200, which endorsed with clarifications and exceptions, the industry consensus standards for PRAs for internal events, internal floods, fires, and other external events (i.e., seismic, external flooding, high winds, etc.). The NRC staff position provided in Regulatory Issue Summary 2007-06 allows 1 year before the NRC expects a licensee to implement revisions to RG 1.200 in its PRA model that is used as a basis for risk-informed LARs.

Regulatory Position 2.1 of RG 1.200 states that if a licensee demonstrates that the parts of a PRA used to support an application comply with the ASME/ANS standard when supplemented to account for the staff's regulatory positions contained in RG 1.200, Appendix A, the NRC would consider the PRA to be adequate to support the applicable risk-informed regulatory application. In general, the staff anticipates that current good practice (i.e., meeting Capability Category II for the supporting requirements (SRs) in the ASME/ANS standard), is the level of detail that is adequate for the majority of applications. However, for some applications, Capability Category I may be sufficient for some SRs, whereas for other applications, it may be necessary to achieve Capability Category III for specific SRs.

As discussed in Section 3.4.1.1.1 of this evaluation, the scope of the licensee's evaluation should include an assessment of the change in risk for internal events, internal flooding, internal fires, and seismic events. The licensee provides a quantitative assessment of the change in risk using a PRA model, which includes an assessment of internal events and internal flooding. For internal fires and seismic hazards, the licensee provides a qualitative assessment of the change in risk that is based on insights gained from the internal events and flooding PRA model.

3.4.1.1.2.1 Internal Events and Internal Flooding Assessment

In November 2008, the licensee completed a peer review of its then current base PRA model (Model 4.1) against the industry PRA standard contained in ASME/ANS RA-Sb-2005 in accordance with Nuclear Energy Institute (NEI) 05-04, Revision 1 (Draft), "Process for Performing Internal Events PRA Peer Reviews Using the ASME/ANS PRA Standard." The peer review assessed the PRA model and all applicable supporting documentation against the applicable high-level requirement and SRs indicated in the standard. The PRA peer review resulted in a number of facts and observations (F&Os) that indicated a number of SRs were categorized as "not met" for Capability Category II. The licensee included in its LAR a summarization of each of the F&Os identified during the November 2008 peer review, including a brief summary of the resolution for each.

In September 2014, the licensee updated its model of record to model version SA112A. The new version served to address the peer review F&Os, open updating requirement evaluations, and update plant-specific data. In accordance with RG 1.200, Revision 2, the licensee performed a self-assessment to identify and address differences in the high-level requirements and SRs that were revised between the 2005 and 2009 versions of the ASME/ANS PRA standard. In addition, the licensee performed a gap assessment against the NRC regulatory

position on ASME/ANS RA-Sa-2009 contained in Appendix A of RG 1.200 in order to ensure the PRA accounts for the staff's regulatory positions.

As part of its application, the licensee included F&O summary tables, a self-assessment summary table, and a gap analysis summary table. The F&O tables included the capability category each applicable SR met, a summary the F&Os for each SR that did not meet Capability Category II or higher, and the licensee's resolutions of the F&Os. The self-assessment table identified and addressed all applicable differences between ASME/ANS RA-Sb-2005 and RA-Sa-2009. The gap assessment table identified and addressed any gaps in the SRs capability categories and the NRC qualifications contained in Appendix A of RG 1.200, Revision 2. The staff reviewed the F&O, self-assessment, and gap assessment summaries.

Based on the review of the licensee's LAR, as supplemented, the NRC staff finds that the licensee, consistent with RG 1.200, has identified and addressed all applicable differences between ASME/ANS RA-Sb-2005 and RA-Sa-2009, and has supplemented RA-Sa-2009 appropriately with the applicable regulatory positions contained in RG 1.200, Appendix A. In addition, the NRC staff finds that the F&Os associated with SRs that did not meet at least Capability Category II of the ASME/ANS standard either did not have an impact on this application or that the licensee dispositioned and/or resolved them sufficiently for use in this application. As such, consistent with Regulatory Position 2.1 of RG 1.200, the technical acceptability of the licensee's PRA for internal events and internal flooding is sufficient for use in supporting this specific risk-informed regulatory application.

3.4.1.1.2.2 Internal Fires and Seismic Hazard Assessment

As outlined in RGs 1.174 and 1.177, a licensee may qualitatively evaluate hazards provided that the qualitative assessment is of sufficient quality to demonstrate that the contribution to the risk increase is insignificant enough that it would not affect the staff's decision. Because the licensee's PRA model of record does not account for the risk associated with internal fires or seismic events, the licensee provided a qualitative evaluation of the change in risk associated with those hazards.

In the licensee's supplement dated May 4, 2017, the licensee provided a qualitative evaluation based on high-level quantitative insights of the risk increase associated with internal fires and seismic hazards from the PRA model of record. The staff found that the licensee's qualitative evaluation demonstrated that the contribution to the risk increase from fires and seismic hazards was insignificant.

In the licensee's September 14, 2017, supplement, the licensee stated that the qualitative analysis provided in the May 4, 2017, supplement is based on the more recent model of record, model SA115A, which has not undergone a peer review or self-assessment. The September 14, 2017, letter contained a description of all of the major and minor changes between the SA112A and SA115A PRA models. The licensee asserts that all changes (both major and minor) to model SA112A do not constitute a PRA upgrade, as defined in ASME/ANS RA-Sa-2009, and are, therefore, considered PRA maintenance. The NRC staff disagrees with the licensee's assertion and believes that the two major changes described by the licensee constitute a PRA upgrade.

According to ASME/ANS RA-Sa-2009, PRA upgrades include significant changes in scope or capability that impact the significant accident sequences or the significant accident progression

sequences in the PRA model. The licensee's PRA model SA2115A includes the following two major changes to model SA112A:

- Incorporation of a plant modification that installed a fourth motor driven auxiliary feedwater pump that is independently powered by a separate diesel generator.

- Further refinement was made to the station blackout event tree sequences to take into account use of FLEX equipment and updated loss of offsite power non-recovery data from Idaho National Laboratory.

The incorporation of these two changes are changes in capability that would impact the significant accident sequences or the significant accident progression sequences. These two changes add an additional layer of defense-in-depth that would lower the CDF and LERF contributions of associated accident sequences and accident progression sequences. However, because the licensee only uses model SA115A in this application to establish a qualitative argument using high-level quantitative insights of the risk increase associated with internal fires and seismic hazards, the incorporation of these two changes would not have any appreciable impact on risk contribution for this specific application. In addition, the licensee's calculated risk metrics for internal events and internal flooding have significant margin below the acceptance guidelines in RGs 1.174 and 1.177.

Based on the review of the licensee's LAR, as supplemented, the NRC staff finds that the qualitative assessment is of sufficient quality to demonstrate that the contribution to the risk increase from internal fires and seismic events is insignificant such that it would not affect the staff's decision. As such, consistent with RGs 1.174 and 1.177, the licensee's qualitative assessment of the risk contribution from internal fires and seismic events is sufficient for use in this specific risk-informed application.

3.4.1.2 PRA Insights

Based on the quantitative assessment of internal events and internal flooding provided in the LAR, using PRA model of record SA112A, and taking into account the addition of compensatory measures, the licensee calculated the ΔCDF, ΔLERF, ICCDP, and ICLERP for the proposed 14-day CFCU AOT. The results of the quantitative evaluations are presented in the table below and compared to the acceptance guidelines of RGs 1.174 and 1.177.

14-day unavailability of two CFCUs		
Risk Metric	Acceptance Guideline	PRA Results
ΔCDF	RG 1.174, Figure 4 (Region II or III)	5.6E-08 (Region III)
ΔLERF	RG 1.174, Figure 5 (Region II or III)	2.15E-10 (Region III)
ICCDP	< 1.0E-6	2.8E-08
ICLERP	< 1.0E-7	1.08E-10

The risk values in the above table are well below the RGs 1.174 and 1.177 acceptance guidelines for an acceptable change in risk (ΔCDF and ΔLERF) and incremental increase in risk (i.e., ICCDP and ICLERP).

For seismic events, the licensee's bounding analysis is based on the product of the frequency of exceeding the safe shutdown earthquake peak ground acceleration of 0.2g and the annual average change in the failure probability of the containment heat removal function resulting from

the CFCU AOT extension. As shown in the licensee's supplements, the product of the two values is 7.6E-08/year. It should be emphasized that the frequency derived here is a bounding value and is not equivalent to a calculated ΔCDF from a seismic PRA model. Rather, the derivation provides a surrogate measure of risk increase in the context of the impact of the CFCU AOT extension.

For internal fires, the licensee's bounding analysis uses quantitative estimates from the PRA model SA115A to show the low risk impact involving unavailability of CFCUs. The CFCUs are mainly required in the PRA model when the containment spray system fails while in sump recirculation during feed and bleed with auxiliary feedwater unavailable. To illustrate the low risk impact from fire hazards, the licensee performed an evaluation following the intent of 10 CFR 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," in which one train of support systems is available from a deterministic standpoint. The Appendix R criteria for one train of auxiliary feedwater and containment spray system (in recirculation mode) being available can be used as the input for a worst-case fire scenario. Given the systems available following a fire event, the licensee uses its PRA to model the random failures of equipment or operator actions that can lead to the loss of these systems. The licensee uses a combination of quantified random failure probabilities, a fire event frequency, and a fractional exposure time to quantify a surrogate for the fire ΔCDF. As shown in the licensee's supplement dated May 4, 2017, the resulting surrogate for the fire ΔCDF is 1.7E-07. Again, it should be emphasized that the frequency derived here is a bounding value and is not equivalent to a calculated ΔCDF from a fire PRA model but only a surrogate measure of risk increase in the context of the impact of the CFCU AOT extension.

The licensee stated that because the containment heat removal function for the predominant internal events accident scenarios provides long-term containment heat removal, failure of the CFCUs does not lead to a large, early release. As a result, an increase in the AOT for CFCUs has a minimal impact on LERF in the internal events and flooding evaluation and is expected to have minimal impact for internal fires and seismic events.

Based on the staff's review of the licensee's LAR, as supplemented, the NRC staff finds that the licensee performed its Tier 1 risk evaluation consistent with the guidance specified in RG 1.177, and it is acceptable for use in this specific risk-informed application.

3.4.2 Tier 2: Risk-Significant Plant Configurations

The avoidance of risk-significant plant configurations limits potentially high-risk configurations that could exist if equipment, in addition to that associated with the proposed TS change, is simultaneously removed from service or other risk-significant operational factors such as concurrent system or equipment testing are involved. Therefore, a licensee's Tier 2 evaluation should ensure that appropriate restrictions are placed on dominant risk-significant configurations relevant to the proposed TS change.

The NRC staff reviewed the licensee's Tier 2 sensitivity analyses contained in the March 6, 2017, request. The licensee appropriately evaluated potentially high-risk configurations and did not identify any new risk configurations that would warrant the licensee to implement further measures other than what is identified in the licensee's site protected equipment program.

Based on the review of the licensee's LAR, as supplemented, the NRC staff finds that the licensee performed its Tier 2 risk evaluation consistent with the guidance specified in RG 1.177, and it is acceptable for use in this specific risk-informed application.

3.4.3 Tier 3: Risk-Informed Configuration Risk Management

Consistent with the key principle in RG 1.177 that changes to TSs result in small increases in the risk to public health and safety, the licensee needs to utilize certain configuration controls. Tier 3 is the establishment of an overall configuration risk management program to ensure that other potentially lower probability, but nonetheless risk-significant, configurations resulting from maintenance and other operational activities are identified and compensated for.

The licensee's Tier 3 program: (1) ensures that additional maintenance does not increase the likelihood of an initiating event intended to be mitigated by the out-of-service equipment such as redundant or associated systems or components, (2) evaluates the effects of additional equipment out of service during CFCU maintenance activities that would adversely impact risk, and (3) evaluates the impact of maintenance on equipment or systems assumed to remain operable by the CFCU AOT analysis.

The Maintenance Rule, as codified in 10 CFR 50.65(a)(4), requires licensees to assess and manage the increase in risk that may result from the proposed maintenance activities (e.g. surveillance testing, and corrective and preventive maintenance). Therefore, a licensee may use its existing Maintenance Rule program to satisfy Tier 3.

Risk associated with unavailable plant equipment, such as CFCUs, is assessed at Salem as required by 10 CFR 50.65(a)(4). The PSEG work management administrative procedure governs online risk assessments. The licensee describes the online risk assessment as a blended approach using qualitative or defense-in-depth considerations and quantifiable PRA risk insights, when available, to complement the qualitative assessment. The licensee communicates online plant risk using three risk tiers (GREEN, YELLOW, and RED).

The licensee's online risk assessment shows that the risk level for both Salem Units will remain GREEN when two CFCUs are unavailable. The licensee stated, that at this level, risk is considered close to baseline, and compliance with TS requirements may be considered adequate risk management. In addition, the licensee's station protected equipment program requires protection of the remaining CFCUs and one of the two containment spray pumps. The program also requires protection of emergency diesel generators that supply emergency power to the remaining CFCUs. Protecting equipment at Salem entails posting of signs and robust barriers to alert personnel not to approach the protected equipment, and work on protected equipment is generally disallowed. The licensee allows limited exceptions for activities such as inspections, security patrols, or emergency operations. Other exceptions may be authorized by the station shift manager in writing. If additional unplanned equipment unavailability occurs, station procedures direct that the risk be re-evaluated, and if found to be unacceptable, compensatory actions are taken until such a time that the risk is reduced to an acceptable level.

Based on the review of the licensee's LAR, as supplemented, the NRC finds that the licensee's Tier 3 configuration risk management program is consistent with the guidance specified in RG 1.177, and it is acceptable for use in this specific risk-informed application.

3.4.5 Key Principle 4: Conclusion

The licensee's three-tiered approach, as described above, consistent with Regulatory Position 2.3 of RG 1.177 and is consistent with Key Principle 4 of RG 1.177.

3.5 Key Principle 5: Performance Monitoring

To ensure that extension of a TS AOT does not degrade operational safety over time, the licensee should ensure, as part of its Maintenance Rule program (10 CFR 50.65), that when equipment does not meet its performance criteria, the evaluation required under the Maintenance Rule includes prior related TS changes. If the licensee concludes that the performance or condition of TS equipment affected by a TS change does not meet established performance criteria, appropriate corrective action should be taken in accordance with the Maintenance Rule. Such corrective action could include consideration of another TS change to shorten the revised AOT, or imposition of a more restrictive administrative limit, if the licensee determines this to be an important factor in reversing the negative trend.

As described in its March 6, 2017, request, the licensee monitors the reliability and availability of the CFCUs using its Maintenance Rule program. If the pre-established reliability or availability performance criteria are not achieved for the CFCUs, they are considered for 10 CFR 50.65(a)(1) actions, which require increased management attention and goal setting in order to restore their performance to an acceptable level.

Based on the review of the licensee's LAR, as supplemented, the NRC staff finds that the implementation and monitoring program for the proposed TS change described by the licensee is consistent with Key Principle 5 of RG 1.177.

3.6 Technical Conclusion

The NRC staff has evaluated the licensee's proposal to revise Salem, Unit Nos. 1 and 2, TSs to extend the CFCU AOT from 7 days to 14 days for one or two inoperable CFCUs. Based on the information provided above, the NRC staff finds that the proposed changes meet the five key principles stated in RG 1.177. Specifically, the proposed changes meet the current regulations, are consistent with the defense-in-depth philosophy, maintain sufficient safety margins, the risk increase is small and consistent with the intent of the Commission's Safety Goal Policy Statement, and the licensee has performance measurement strategies in place to monitor the impact of the proposed changes. Therefore, the NRC staff finds that the proposed changes are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State official was notified of the proposed issuance of the amendments on July 18, 2017. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR Part 20. 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 (82 FR 26316). 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. Letter from Charles V. McFeaters, PSEG, to NRC, "License Amendment Request: Salem Containment Fan Cooler Unit (CCU) Allowed Outage Time (AOT) Extension," March 6, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17065A241).

2. Letter from Charles V. McFeaters, PSEG, to NRC, "Supplemental Information Needed for Acceptance of Requested Licensing Action Re: Containment Fan Cooler Unit (CFCU) Allowed Outage Time (AOT) Extension (CAC Nos. MF9364 and MF9365)," May 4, 2017 (ADAMS Accession No. ML17125A051).

3. Letter from Charles V. McFeaters, PSEG, to NRC, "Response to Request for Additional Information – Salem Units 1 and 2 – Containment Fan Coil Unit Allowed Outage Time Extension Amendment Request," September 14, 2017 (ADAMS Accession No. ML17257A439).

4. NRC RG 1.174, Revision 2, "An Approach for Using Probabilistic Risk Assessment in Risk-informed Decisions on Plant-Specific Changes to the Licensing Bases," May 2011 (ADAMS Accession No. ML100910006).

5. NRC RG 1.177, Revision 1, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," May 2011 (ADAMS Accession No. ML100910008).

6. NRC RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," March 2009 (ADAMS Accession No. ML090410014).

7. NRC Regulatory Issue Summary 2007-06, "Regulatory Guide 1.200 Implementation," March 22, 2007 (ADAMS Accession No. ML070650428).

8. NRC Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment" July 18, 1989 (ADAMS Accession No. ML081090381).

9. NRC NUREG-1407, "Procedural and Submittal Guidance of the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities, Final Report," published June 1991 (ADAMS Accession No. ML063550238).

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Date: January 18, 2018

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENTS RE: CONTAINMENT FAN COIL UNIT ALLOWED OUTAGE TIME EXTENSION (CAC NOS. MF9364 AND MF9365; EPID L-2017-LLA-0212) DATED JANUARY 18, 2018

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