



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

April 11, 2019

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

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENT NOS. 328 AND 309 RE: REVISE TECHNICAL SPECIFICATIONS TO EXTEND REFUELING WATER STORAGE TANK ALLOWED OUTAGE TIME (EPID L-2018-LLA-0184)

Dear Mr. Sena:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment Nos. 328 and 309 to Renewed Facility Operating License Nos. DPR-70 and DPR-75 for the Salem Nuclear Generating Station, Unit Nos. 1 and 2 (Salem), respectively. These amendments consist of changes to the technical specifications (TSs) in response to your application dated June 29, 2018.

The amendments delete duplicative TS requirements for the refueling water storage tank in TS 3.1.2.6, "Borated Water Sources – Operating"; revise TS 3.5.5, "Refueling Water Storage Tank," to ensure compliance with assumptions used in the design-basis accident and containment response analyses; and to make Salem TS requirements for the refueling water storage tank consistent with NUREG 1431, Revision 4.0, "Standard Technical Specifications – Westinghouse Plants."

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

Sincerely,

A handwritten signature in black ink that reads "James S. Kim".

James S. Kim, 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. 328 to DPR-70
2. Amendment No. 309 to DPR-75
3. Safety Evaluation

cc: 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 RENEWED FACILITY OPERATING LICENSE

Amendment No. 328  
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 June 29, 2018, 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.

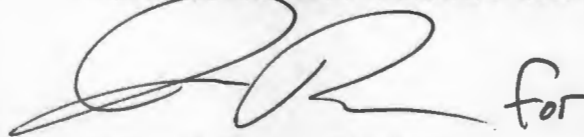
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. DPR-70 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 328, 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 of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'JD' followed by a flourish, with the word 'for' written in cursive to the right.

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: April 11, 2019

ATTACHMENT TO LICENSE AMENDMENT NO. 328  
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.

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Page 3

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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.

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3/4 5-7

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. 328, 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

## REACTIVITY CONTROL SYSTEMS

### 3/4.1.2 BORATION SYSTEMS

#### FLOW PATHS - SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

---

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

- a. A flow path from the boric acid tanks via a boric acid transfer pump and a charging pump to the Reactor Coolant System if the boric acid storage system is OPERABLE, per Specification 3.1.2.6a while in MODE 4, or per Specification 3.1.2.5a while in MODE 5 or 6, or
- b. A flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if the refueling water storage tank is OPERABLE per Specification 3.5.5 while in MODE 4, or per Specification 3.1.2.5b while in MODE 5 or 6.

APPLICABILITY: MODES 4, 5 and 6.

#### ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one injection path is restored to OPERABLE status.

#### SURVEILLANCE REQUIREMENTS

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4.1.2.1 At least one of the above required flow paths shall be demonstrated OPERABLE:

- a. When the boric acid tank is a required water source, by verifying in accordance with the Surveillance Frequency Control Program that:
  - (1) The flow path from the boric acid tank to the boric acid transfer pump, the boric acid transfer pump, and the recirculation path from the boric acid transfer pump to the boric acid tank is  $\geq 63^{\circ}\text{F}$ , and
  - (2) The flow path between the boric acid transfer pump recirculation line to the charging pump suction line is  $\geq 50^{\circ}\text{F}$ ,
- b. In accordance with the Surveillance Frequency Control Program by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

## REACTIVITY CONTROL SYSTEMS

### BORATED WATER SOURCES - OPERATING

#### LIMITING CONDITION FOR OPERATION

---

3.1.2.6 As a minimum, the following borated water source(s) shall be OPERABLE as required by specifications 3.1.2.1 and 3.1.2.2:

- a. A boric acid storage system with:
  - 1. A contained volume of borated water in accordance with figure 3.1.2,
  - 2. A boron concentration in accordance with figure 3.1-2, and
  - 3. A minimum solution temperature of 63°F.
- b. The refueling water storage tank per Specification 3.5.5.

APPLICABILITY: MODES 1, 2, 3 and 4.

#### ACTION:

- a. With the boric acid storage system inoperable and being used as one of the above required boration water systems, restore the storage system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 1% delta K/k at 200°F; restore the boric acid storage system to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.
- b. With the refueling water storage tank inoperable, perform the Action described in Specification 3.5.5.

## REACTIVITY CONTROL SYSTEMS

### SURVEILLANCE REQUIREMENTS

---

4.1.2.6 Each borated water source shall be demonstrated OPERABLE:

- a. For the boric acid storage system, when it is the source of borated water in accordance with the Surveillance Frequency Control Program by:
  - 1. Verifying the boron concentration in each water source,
  - 2. Verifying the water level of each water source, and
  - 3. Verifying the boric acid storage system solution temperature.
- b. For the refueling water storage tank per Surveillance 4.5.5.



## EMERGENCY CORE COOLING SYSTEMS

### REFUELING WATER STORAGE TANK

#### LIMITING CONDITION FOR OPERATION

---

3.5.5 The refueling water storage tank (RWST) shall be OPERABLE with:

- a. A contained volume of  $\geq 364,500$  gallons of borated water.
- b. A boron concentration of between 2300 and 2500 ppm, and
- c. RWST borated water temperature  $\geq 35^{\circ}\text{F}$  and  $\leq 100^{\circ}\text{F}$ .

APPLICABILITY: MODES 1, 2, 3 and 4.

#### ACTION:

- a. With the RWST inoperable due to boron concentration or temperature not within limits, restore the tank to OPERABLE status within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With the RWST inoperable for reasons other than boron concentration or temperature not within limits, restore the tank 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.

#### SURVEILLANCE REQUIREMENTS

---

4.5.5 The RWST shall be demonstrated OPERABLE:

- a. In accordance with the Surveillance Frequency Control Program by:
  1. Verifying the water level in the tank, and
  2. Verifying the boron concentration of the water.
- b. In accordance with the Surveillance Frequency Control Program by verifying the RWST temperature when the outside air temperature is  $< 35^{\circ}\text{F}$  or  $> 100^{\circ}\text{F}$ .



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. 309  
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 June 29, 2018, 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) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 309, 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 of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read 'JGD for', is written over the typed name and title.

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: April 11, 2019

ATTACHMENT TO LICENSE AMENDMENT NO. 309  
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.

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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 contains marginal lines indicating the areas of change.

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- (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. 309, 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.

## REACTIVITY CONTROL SYSTEMS

### 3/4.1.2 BORATION SYSTEMS

#### FLOW PATHS - SHUTDOWN

#### LIMITING CONDITION FOR OPERATION

---

3.1.2.1 As a minimum, one of the following boron injection flow paths shall be OPERABLE:

- a. A flow path from the boric acid tanks via a boric acid transfer pump and a charging pump to the Reactor Coolant System if the boric acid storage system is OPERABLE, per Specification 3.1.2.6a while in MODE 4, or per Specification 3.1.2.5a while in MODE 5 or 6, or
- b. A flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System if the refueling water storage tank is OPERABLE per Specification 3.5.5 while in MODE 4, or per Specification 3.1.2.5b while in MODE 5 or 6.

APPLICABILITY: MODES 4, 5 and 6.

#### ACTION:

With none of the above flow paths OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until at least one injection path is restored to OPERABLE status.

#### SURVEILLANCE REQUIREMENTS

---

4.1.2.1 At least one of the above required flow paths shall be demonstrated OPERABLE:

- a. When the boric acid tank is a required water source, by verifying in accordance with the Surveillance Frequency Control Program that:
  - (1) The flow path from the boric acid tank to the boric acid transfer pump, the boric acid transfer pump, and the recirculation path from the boric acid transfer pump to the boric acid tank is  $\geq 63^{\circ}\text{F}$ , and
  - (2) The flow path between the boric acid transfer pump recirculation line to the charging pump suction line is  $\geq 50^{\circ}\text{F}$ ,
- b. In accordance with the Surveillance Frequency Control Program by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

## REACTIVITY CONTROL SYSTEMS

### BORATED WATER SOURCES - OPERATING

#### LIMITING CONDITION FOR OPERATION

---

3.1.2.6 As a minimum, the following borated water source(s) shall be OPERABLE as required by Specifications 3.1.2.1 and 3.1.2.2:

- a. A boric acid storage system with:
  - 1. A contained volume of borated water in accordance with figure 3.1-2,
  - 2. A Boron concentration in accordance with Figure 3.1-2, and
  - 3. A minimum solution temperature of 63°F.
- b. The refueling water storage tank per Specification 3.5.5

APPLICABILITY: MODES 1, 2, 3 and 4.

#### ACTION:

- a. With the boric acid storage system inoperable and being used as one of the above required borated water sources, restore the storage system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to at least 1% delta k/k at 200°F; restore the boric acid storage system to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.
- b. With the refueling water storage tank inoperable, perform the Action in Specification 3.5.5.

#### SURVEILLANCE REQUIREMENTS

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4.1.2.6 Each borated water source shall be demonstrated OPERABLE:

- a. For the boric acid storage system, when it is the source of borated water in accordance with the Surveillance Frequency Control Program by:
  - 1. Verifying the boron concentration in each water source.
  - 2. Verifying the water level of each water source, and
  - 3. Verifying the boric acid storage system solution temperature.
- b. For the refueling water storage tank per Surveillance Requirement 4.5.5.

## EMERGENCY CORE COOLING SYSTEMS

### REFUELING WATER STORAGE TANK

#### LIMITING CONDITION FOR OPERATION

---

3.5.5 The refueling water storage tank (RWST) shall be OPERABLE with:

- a. A contained volume of  $\geq 364,500$  gallons of borated water.
- b. A boron concentration of between 2,300 and 2,500 ppm, and
- c. RWST borated water temperature  $\geq 35^{\circ}\text{F}$  and  $\leq 100^{\circ}\text{F}$ .

APPLICABILITY: MODES 1, 2, 3 and 4.

#### ACTION:

- a. With the RWST inoperable due to boron concentration or temperature not within limits, restore the tank to OPERABLE status within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With the RWST inoperable for reasons other than boron concentration or temperature not within limits, restore the tank 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.

#### SURVEILLANCE REQUIREMENTS

---

4.5.5 The RWST shall be demonstrated OPERABLE:

- a. In accordance with the Surveillance Frequency Control Program by:
  1. Verifying the water level in the tank, and
  2. Verifying the boron concentration of the water.
- b. In accordance with the Surveillance Frequency Control Program by verifying the RWST temperature when the outside air temperature is  $< 35^{\circ}\text{F}$  or  $> 100^{\circ}\text{F}$ .





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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 328 AND 309 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 June 29, 2018 (Agencywide Documents Access and Management System Accession No. ML18183A025), PSEG Nuclear LLC (PSEG, the licensee) submitted a license amendment request (LAR) to revise the Salem Nuclear Generating Station, Unit Nos. 1 and 2 (Salem). The proposed changes delete duplicative technical specification (TS) requirements for the refueling water storage tank (RWST) in TS 3.1.2.6, "Borated Water Sources - Operating"; revise TS 3.5.5, "Refueling Water Storage Tank," to ensure compliance with assumptions used in the design-basis accident and containment response analyses; and to make Salem TS requirements for the RWST consistent with NUREG-1431, Revision 4.0, "Standard Technical Specifications – Westinghouse Plants."

2.0 REGULATORY EVALUATION

2.1 Regulatory Criteria and Guidance

Title 10 of the *Code of Federal Regulations* (10 CFR) 50.36, "Technical specifications," establishes U.S. Nuclear Regulatory Commission (NRC, the Commission) regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36, TSs for operating nuclear power plants are required to include items in five different categories, including limiting conditions for operation (LCOs).

Appendix A, "General Design Criteria for Nuclear Power Plants" (GDC) to 10 CFR Part 50, GDC 35, "Emergency Core Cooling," provides applicable emergency core cooling system (ECCS) design criteria, stating that the ECCS shall "transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented, and (2) clad metal-water reaction is limited to negligible amounts."

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition – Transient and Accident Analysis" (SRP), acceptance criteria meet the relevant requirements of the NRC's regulations identified above to assure that, following a loss-of-coolant accident (LOCA), the reactor core will remain in a coolable geometry.

## 2.2 System Description

The RWST supplies borated water to the chemical and volume control system (CVCS) during abnormal operating conditions, to the refueling cavity during refueling, and to the ECCS during accident conditions.

Adequate borated water also should exist to supply the containment spray (CS) pumps if these pumps are actuated. This volume of stored borated water is sufficient to fill the containment sump to a depth necessary to provide an adequate net positive suction head for the residual heat removal pumps during long-term recirculation. The RWST supplies both trains of the ECCS through one header, and both trains of the CS system through a separate supply header during the injection phase of a LOCA.

During normal plant operation in Modes 1 through 4, the RWST is required to be operable to maintain a borated water supply for accident mitigation purposes. In these modes, the safety injection, CS, and residual heat removal pumps are aligned to take suction from the RWST. The centrifugal charging pumps operate during normal plant operation with their suction aligned to the CVCS volume control tank. The switchover from normal operation to the injection phase of ECCS operation requires auto-transfer of the centrifugal charging pump suction from the CVCS volume control tank to the RWST.

During refueling operation, the RWST is required to be operable as a borated water supply, should the boric acid storage system not be operable. The contents of the RWST are also used to flood the refueling cavity during refueling operation. The water in the RWST is borated to a concentration sufficient to ensure that shutdown margin is maintained when the reactor is at cold shutdown conditions, should RWST water be added to the reactor.

## 2.3 Proposed TS Change

In TS 3.1.2.6, LCO 'b' and associated Action statement 'b' are redundant to the TS 3.5.5 LCO. The change to TS 3.1.2.1, LCO 'b' to replace the reference to TS 3.1.2.6b with a reference to TS 3.5.5 is required to align the TSs to the correct LCO governing RWST operability.

The change to TS 3.5.5, LCO 'a' to eliminate the upper limit of 400,000 gallons for RWST volume is proposed, since the physical capacity of the RWST cannot exceed 400,000 gallons based on its vented design and the physical location of its overflow.

The change to TS 3.5.5, LCO 'c' to add an upper limit of 100 degrees Fahrenheit (°F) for RWST temperature ensures compliance with assumptions used in the design-basis accident and containment response analyses.

The revised TS 3.5.5, Action 'a' would state, in part:

With the RWST inoperable due to boron concentration or temperature not within the limits, restore the tank to OPERABLE status within 8 hours...

### 3.0 TECHNICAL EVALUATION

During accident conditions, the RWST is capable of providing a source of borated water to the ECCS and CS system pumps. To be considered operable, the RWST must meet the water volume and boron concentration established in the TSs.

The RWST operability ensures that an adequate supply of borated water is available (1) to cool and depressurize the containment in the event of a design-basis accident, (2) to cool and cover the core in the event of a LOCA, (3) to maintain the reactor subcritical following a design-basis accident, (4) to ensure adequate water level in the containment sump to support continued ECCS and CS function in the recirculation mode following a LOCA, and (5) to provide an alternate borated water source for reactivity control.

At Salem, the large-break LOCA is the limiting event regarding the RWST-contained water volume. For the Salem large-break LOCA analysis, the RWST water volume of 193,000 gallons, and the lower limit of 2,300 pounds per million (ppm) boron concentration are used (Salem Updated Final Safety Analysis Report (UFSAR), Section 6.3, "Coolant Quantity") to compute the post-LOCA sump boron concentration necessary to assure subcriticality. The upper limit on boron concentration of 2,500 ppm is used to determine the maximum allowable time to initiate hot leg recirculation following a LOCA. The purpose of initiating hot leg recirculation is to avoid boron precipitation in the core following the accident.

The upper and lower boron concentration limits were originally located in TS 3.1.2.6 b. However, in the proposed LAR, these limits are relocated to TS 3.5.5 with no changes to their values.

#### 3.1 Eliminate the 400,000 Gallon for RWST Volume

The change to TS 3.5.5, LCO 'a' to eliminate the upper limit of 400,000 gallons for RWST volume is proposed, since the physical capacity of the RWST cannot exceed 400,000 gallons based on its vented design and the physical location of its overflow. As discussed above, the proposed limit of 364,500 gallons meets the Salem accident analyses requirement of 193,000 RWST contained water volume. This proposed change will continue to meet 10 CFR 50.36 TS requirements and 10 CFR GDC 35 core cooling regulations following a LOCA event and will meet the SRP post-LOCA acceptance criteria as discussed in Section 2 of this safety evaluation. The change is, therefore, acceptable.

#### 3.2 Addition of Upper RWST Temperature Limit and RWST Allowed Outage Time

The NRC staff's review of the Salem UFSAR indicated that a LOCA and post-DBA containment response are the events in which RWST temperature could impact the analyses results. The licensee stated in the LAR that for these events, RWST temperature of 100 °F bounds the input assumption of the Salem, Unit No. 1 and 2, accident analyses. The staff reviewed the Salem UFSAR discussions related to LOCA analyses (Section 15.6.5), and determined that the above statement related to the RWST bounding temperature is reasonable and acceptable.

Due to the large volume of the RWST water inventory, temperature variations in the RWST inventory occur very slowly. Operational procedures at Salem are in place to prevent operation of the RWST outside of the allowed temperature limits. To restore a temperature reading that is above its limit, cooler inventory can be added to the tank. In the event a temperature reading is found to be below its limit, the RWST heating recirculation pump would be placed in operation to

heat the RWST inventory. The proposed increase of the allowed outage time (AOT) from 1 hour to 8 hours for the RWST will reduce the probability of unnecessary plant shutdowns and transients. The 8-hour allowed outage time provides a reasonable timeframe for operators to identify the cause of a boron concentration or temperature deviation, and to institute appropriate corrective actions.

The AOTs provided in the plant TSs are designed to permit limited operation with a temporary relaxation of the LCO requirement. The staff considered the acceptability of the maximum length of the AOT interval relative to the potential occurrences of design-basis events. Extending the AOT for an inoperable RWST does not change the design basis for the ECCS. The RWST provides borated water to fill the refueling cavity during a refueling outage. In the event that a LOCA occurs during an extended AOT, reactor operators would be able to manually initiate RWST flow, to provide borated water per its design basis. Therefore, RWST unavailability during the extended AOT interval does not impact the Salem accident analyses results, and the RWST would continue to meet the requirements of GDC 35. The proposed increase of the RWST AOT from 1 hour to 8 hours is, therefore, acceptable.

### 3.3 Conclusion

The NRC staff has evaluated the proposed changes to determine compliance with applicable regulatory requirements as specified in Section 2.1 of this safety evaluation. Based on the evaluation discussed above, the staff has determined that the proposed TS changes will continue to meet SRP guidance and continue to meet the requirements of 10 CFR 50.36 and GDC 35. Therefore, the staff concludes that the proposed changes to TS 3.1.2.1, TS 3.1.2.6, and TS 3.5.5 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 October 15, 2018. The State official had no comments.

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to the installation or use of facility components 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 (83 FR 43907; August 28, 2018), and there has been no public comment on such finding. 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.

Principal Contributor: F. Forsaty

Date: April 11, 2019

**SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 – ISSUANCE OF AMENDMENT NOS. 328 AND 309 RE: REVISE TECHNICAL SPECIFICATIONS TO EXTEND REFUELING WATER STORAGE TANK ALLOWED OUTAGE TIME (EPID L-2018-LLA-0184) DATED APRIL 11, 2019**

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**ADAMS Accession No.: ML19077A336**

\*by memorandum

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OFFICE	NRR/DORL/LPL1/PM	NRR/DORL/LPL1/LA	NRR/DSS/SRXB/BC*	NRR/DSS/STSB/BC
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DATE	03/26/2019	03/25/2019	03/8/2019	03/29/2019
OFFICE	OGC – NLO**	NRR/DORL/LPL1/BC	NRR/DORL/LPL1/PM	
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