



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION I  
2100 RENAISSANCE BLVD., SUITE 100  
KING OF PRUSSIA, PA 19406-2713

May 10, 2016

Mr. Robert C. Braun  
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 –  
INTEGRATED INSPECTION REPORT 05000272/2016001 AND  
05000311/2016001

Dear Mr. Braun:

On March 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Salem Nuclear Generating Station, Units 1 and 2. The enclosed report documents the inspection results, which were discussed on April 27, 2016, with Mr. John Perry, Salem Site Vice President, and other members of your staff.

NRC Inspectors examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The inspectors documented three findings of very low safety significance (Green) in this report. Two of these findings involved violations of NRC requirements. Further, inspectors documented a licensee-identified violation which was determined to be of very low safety significance in this report. The NRC is treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the NCVs in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Salem Nuclear Generating Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding, or a finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at Salem Nuclear Generating Station.

R. Braun

-2-

In accordance with Title 10 of the *Code of Federal Regulations* (CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Fred L. Bower, III, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Docket Nos. 50-272 and 50-311  
License Nos. DPR-70 and DPR-75

Enclosure:  
Inspection Report 05000272/2016001  
and 05000311/2016001  
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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/RA/

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION I**

Docket Nos. 50-272 and 50-311

License Nos. DPR-70 and DPR-75

Report Nos. 05000272/2016001 and 05000311/2016001

Licensee: PSEG Nuclear LLC (PSEG)

Facility: Salem Nuclear Generating Station, Units 1 and 2

Location: P.O. Box 236  
Hancocks Bridge, NJ 08038

Dates: January 1, 2016 through March 31, 2016

Inspectors: P. Finney, Senior Resident Inspector  
A. Ziedonis, Resident Inspector  
R. Barkley, Senior Project Engineer  
R. Nimitz, Senior Health Physicist  
P. Presby, Senior Operations Engineer

Approved By: Fred L. Bower, III, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Enclosure

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## SUMMARY

Inspection Report (IR) 05000272/2016001, 05000311/2016001; 01/01/2016 – 03/31/2016; Salem Nuclear Generating Station Units 1 and 2; Maintenance Effectiveness; Operability Determinations and Functionality Assessments; Follow-Up of Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. The inspectors identified three self-revealing findings of very low safety significance (Green), two of which were non-cited violations (NCVs). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process (SDP)," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5, dated February 2014.

### Cornerstone: Initiating Events

- Green. A self-revealing Green finding against procedure CC-AA-103, Configuration Change Control for Permanent Physical Plant Changes, Revision 15, was identified when PSEG did not adequately evaluate a modification's effect on existing design and operating margins. Specifically, an Advanced Digital Feedwater Control System (ADFCS) modification introduced a steam generator feedwater pump (SGFP) over-acceleration trip feature that was not evaluated and resulted in a SGFP trip and auxiliary feedwater (AFW) actuation. PSEG corrective actions included re-establishing main feedwater, making a report to the NRC via ENS 51738 for the AFW actuation, and entering this in their Corrective Action Program (CAP) as 20718519.

The inadequate evaluation of the ADFCS modification's effect on existing design and operating margins was a performance deficiency. The issue was determined to be more than minor since it was similar to IMC 0612, Appendix E, example 3b in that the design was not correctly translated and resulted in system operation being adversely affected by a SGFP trip and an AFW system actuation. It was also more than minor since it was associated with the design control attribute (plant modification) of the Initiating Events cornerstone and adversely affected its objective to limit the likelihood of events that upset plant stability and challenge critical safety functions. The finding was evaluated in accordance with IMC 0609, Attachment 4 and Appendix A, where it was screened to Green since the transient did not result in both a reactor trip and loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition (loss of feedwater). The finding had a cross-cutting aspect in the area of Human Performance, Change Management, in that, PSEG did not anticipate, manage, and communicate the effects of the over-acceleration trip change in the ADFCS modification to ensure unintended consequences were avoided. [H.3] (Section 1R15)

### Cornerstone: Mitigating Systems

- Green. A self-revealing Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, was identified when PSEG did not assure that an identified condition adverse to quality was corrected. Specifically, PSEG closed a corrective action to address chiller gasket leakage without performing the designated action. This resulted in four subsequent chiller trips due to gasket failures. PSEG entered this issue in the CAP under notification 20708693, and completed ACE 70181604 on December 21, 2015. Corrective actions from the ACE were completed on February 25, 2016, and included: obtaining the proper gasket material; testing an alternative gasket material (Teflon); and establishing interim performance monitoring under Order 80115963.

The inspectors determined that closing a corrective action to correct a condition adverse to quality evaluated by an ACE without implementing the corrective action was a performance deficiency. This performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating System cornerstone, and adversely affected the cornerstone objective of ensuring the availability and reliability of systems that respond to initiating events to prevent undesirable consequences, in that safety-related chillers were subsequently rendered inoperable as a result of not having the proper gasket material. The inspectors determined that this finding screened to Green in accordance with IMC 0609, Appendix A, because the finding did not represent an actual loss of function of at least a single train for greater than its technical specification allowed outage time. The inspectors determined that this finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Resolution, because PSEG did not take effective corrective action to address recurring chiller evaporator head gasket leaks in a timely manner. [P.3] (Section 1R12)

### Cornerstone: Barrier Integrity

- Green. A self-revealing Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, was identified when PSEG did not promptly identify and correct a condition adverse to quality (CAQ). Specifically, PSEG did not promptly identify that negative results of a control room emergency air conditioning system (CREACS) charcoal filtration sample had Technical Specification (TS) implications and correct it prior to violating TSs. In response, PSEG entered Unit 1 TS 3.0.3, suspended irradiated fuel movements on Unit 2 to comply with Unit 2 TS 3.7.6, and commenced actions to re-align control area ventilation to Unit 2 supplying in the maintenance mode. Unit 1 TS 3.0.3 was exited at 7:55 a.m. that morning and PSEG reported this via an 8-hour report to the NRC under ENS 51504. PSEG revised the associated surveillance procedure to write a NOTF to replace the charcoal bank in the next system window if methyl iodide results are greater than or equal to 2 percent penetration (0.5% margin). PSEG documented and evaluated the issue in their CAP as Notifications (NOTFs) 20707922, 20707650, and 20712068.

Untimely identification and correction of the charcoal filter performance was a performance deficiency. The issue was more than minor since it was similar to IMC 0612, Appendix E, example 2.a in that a TS limit was exceeded. Further, it was more than minor since it was associated with the system performance attribute of the Barrier Integrity cornerstone and adversely affected its cornerstone objective to provide reasonable assurance that physical

design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, unsatisfactory charcoal filter performance resulted in inoperability of the single filtration train that was in service. The finding was reviewed in accordance with IMC 0609, Attachment 4 and Appendix A, where it was screened to Green since it only represented a degradation of the radiological barrier function provided for the control room. The finding had a cross-cutting issue in Human Performance, Teamwork, in that PSEG staff did not collaborate and cooperate in connection with operational activities, such as CAP entry and notification of the control room, associated with the CREACS filter testing and results. [H.4] (Section 4OA3)

### **Other Findings**

A violation of very low safety significance that was identified by PSEG was reviewed by the inspectors. Corrective actions taken or planned by PSEG have been entered into PSEG's CAP. This violation and corrective action tracking number are listed in Section 4OA7 of this report.



## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. The unit remained at or near 100 percent power for the remainder of the inspection period.

Unit 2 began the inspection period at 100 percent power. On February 3, the unit was reduced to approximately 75 percent power in support of 500 kilovolt (kV) line outage maintenance. Two and a half hours after reaching that power, the unit tripped on a main generator trip due to high generator voltage. A reactor startup was commenced on February 5 and full power was restored on February 7. On February 14, the unit tripped due to a main generator protection feature associated with stator water cooling. A reactor startup was commenced on February 16 and the unit reached 100 percent power on February 18. The unit remained at or near 100 percent power for the remainder of the inspection period.

### **1. REACTOR SAFETY**

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

1R01 Adverse Weather Protection (71111.01 – 1 sample)

#### **.1 Readiness for Impending Adverse Weather Conditions**

##### **a. Inspection Scope**

The inspectors reviewed PSEG's preparations for an impending blizzard on January 21 and 22. The inspectors reviewed the implementation of adverse weather preparation procedures prior to the onset of the adverse weather conditions. The inspectors walked down the service water (SW) intake structure, circulating water intake structure, Unit 3 gas turbine engine and control house, and the Unit 1 and 2 auxiliary and turbine building roofs. The inspectors verified that operator actions defined in the Public Service Enterprise Group Nuclear LLC's (PSEG's) adverse weather procedure maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel. Documents reviewed for each section of this inspection report are listed in the Attachment.

##### **b. Findings**

No findings were identified.

## 1R04 Equipment Alignment

### .1 Partial System Walkdowns (71111.04Q – 4 samples)

#### a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Unit 1, Emergency diesel generators (EDGs) during 1A EDG inoperability caused by a fuel leak on March 30
- Unit 2, Pressurizer spray system on January 28
- Unit 2, Main stream lineup to 21 steam generator feedwater pump (SGFP) with 22 SGFP tripped on February 16
- Unit 2, 21 and 22 chillers with 23 chiller out of service (OOS) for maintenance on March 21

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the Updated Final Safety Analysis Report (UFSAR), Technical Specifications (TSs), work orders (WOs), notifications (NOTFs), and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted the system's performance of its intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether PSEG staff had properly identified equipment issues and entered them into their Corrective Action Program (CAP) for resolution with the appropriate significance characterization.

#### b. Findings

No findings were identified.

## 1R05 Fire Protection

### Resident Inspector Quarterly Walkdowns (71111.05Q – 6 samples)

#### a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that PSEG controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for OOS, degraded or

inoperable fire protection equipment, as applicable, in accordance with procedures and discussed with station personnel the repair plans for degraded equipment.

- Unit 1, Electrical penetration area on January 29
- Unit 1, Auxiliary building ventilation and volume control tank area on February 25
- Unit 1, Switchgear area on March 4
- Unit 1, Containment fan cooler unit (CFCU) service water (SW) header vaults on March 10
- Unit 1, Charging pump and spray additive tank area on March 25
- Unit 2, Electrical penetration area on January 29

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the UFSAR, the site flooding analysis, and plant procedures to identify internal flooding susceptibilities for the site. The inspectors' review focused on the Unit 2 mechanical penetration area and relation to the residual heat removal sump. It verified the adequacy of equipment seals located below the flood line, floor and water penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers. It assessed the adequacy of operator actions that PSEG had identified as necessary to cope with flooding in this area and also reviewed the CAP to determine if PSEG was identifying and correcting problems associated with both flood mitigation features and site procedures for responding to flooding.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the Unit 1 12A Component Cooling (CC) heat exchanger (HX) readiness and availability to perform its safety functions. The inspectors observed portions of the as-found inspection of the CC HX. The inspectors discussed the results of the most recent inspection with engineering staff and reviewed the results of the eddy current testing performed to measure the HX tube wall thickness. The inspectors verified that PSEG initiated appropriate corrective actions for identified deficiencies. The

inspectors also verified that the number of tubes plugged within the HX did not exceed the maximum amount allowed.

b. Findings

No findings were identified.

1R11 Licensed Operator Regualification Program (71111.11Q – 2 samples)

.1 Quarterly Review of Licensed Operator Regualification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on January 26, which included a leaking main steam isolation vent valve, loss of a control air header, and a steam generator tube rupture. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and the TS action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room

a. Inspection Scope

The inspectors observed and reviewed the Unit 2 reactor startup on February 6 for the plant start-up and grid sync. The inspectors observed operator performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 2 samples)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component performance and reliability.

The inspectors reviewed system health reports, CAP documents, maintenance WOs, and maintenance rule (MR) basis documents to ensure that PSEG was identifying and properly evaluating performance problems within the scope of the MR. For each sample selected, the inspectors verified that the structure, system, or component was properly scoped into the MR in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by PSEG staff was reasonable. As applicable, for structures, systems, and components classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these structures, systems, and components to (a)(2). Additionally, the inspectors ensured that PSEG staff was identifying and addressing common cause failures that occurred within and across MR system boundaries.

- Common, SW strainers on February 1
- Common, Chiller divider plate gaskets on February 29

b. Findings

Introduction. A self-revealing Green non-cited violation (NCV) of 10 CFR Part 50, Appendix B, Criterion XVI, was identified when PSEG did not assure that an identified condition adverse to quality (CAQ) was corrected. Specifically, PSEG closed a corrective action to address chiller gasket leakage without performing the designated action. Consequently, four additional chillers experienced gasket leakage that rendered the chillers inoperable.

Description. The Salem chilled water system consists of three 50 percent capacity safety-related chillers per unit. The safety functions of the chilled water system are to remove sufficient heat loading from the emergency air conditioning units and emergency control air compressors under accident conditions, and remove sufficient heat loading from the main control room air conditioning units under normal operating conditions. The chilled water system operates on a basic refrigeration cycle. The associated evaporator is a shell and U-tube HX, with refrigerant on the tube side and SW on the shell side. The evaporator is designed with bolted-gasket head connections for evaporator tube access. The gasket located at the common tube inlet / outlet head is designed with a divider plate, which separates liquid refrigerant at the tube inlet from refrigerant gas at the tube outlet.

On January 4, 2016, the 12 chiller tripped on low oil pressure. PSEG inspected the compressor and found damage that required compressor replacement. PSEG performed a functional failure cause determination and concluded that the most likely cause of the compressor damage was failure of the divider plate head gasket. The inspectors noted the chillers have experienced multiple gasket failures since 2014, and PSEG had completed multiple CAP causal evaluations regarding chiller head gasket failures. Therefore, the inspectors conducted a historical review of chiller gasket failures since 2014.

On December 8, 2014, PSEG completed root cause evaluation (RCE) 70169007, in response to an August 3, 2014, trip of the 13 chiller on low suction pressure, as well as multiple longstanding and recurring equipment problems on the chilled water system.

PSEG determined the cause of the 13 chiller trip was internal refrigerant leakage across the divider plate head gasket. The RCE also determined the generic neoprene head gasket material should be changed to improve the sealing capability, and further noted historical challenges with hand-cutting the unique divider plate gasket configuration without procedural guidance. Based on engineering and maintenance staff interviews and a work order history review, inspectors determined that PSEG had historically used gaskets that were hand-cut from generic neoprene sheets, purchased under material master (MM) (i.e., PSEG stock code used for purchase orders) Y603504. The RCE assigned corrective action (CRCA) #4, with a due date of December 19, 2014, to revise the gasket MMs X401740 and 1103504 to a pre-cut, "neoprene composite" material, "in accordance with action tracking item (ACIT) #4." The inspectors noted CRCA #4 did not include a requirement to revise MM Y603504. Additionally, ACIT #4 was a separate action item assigned to "determine the proper gasket material per vendor guidance," with an original due date of December 5, 2014. On December 15, 2014, PSEG closed CRCA #4 as completed, however, ACIT #4 was subsequently extended. Additionally, the inspectors reviewed the revised MMs X401740 and 1103504, and noted the gasket material was not changed to neoprene composite, and was not changed in accordance with ACIT #4. LS-AA-125, "Corrective Action Program," Revision 18 defines ACITs as action items to improve performance or make enhancements, and does not require documentation to extend the action item. It defines a CRCA as an action taken or planned that restores a CAQ to an acceptable condition or capability, and requires Department Head approval to extend the action. LS-AA-125, step 4.5.3, states that if the intent of a CRCA cannot be performed as assigned, then the assignee shall review and gain approval for the change with the order 'owed to' department head or designee, and further states to document actions related to this step in a partial confirmation. The inspectors determined that CRCA #4 was not completed satisfactorily, because the gasket MMs were not revised to neoprene composite, were not revised in accordance with ACIT #4, and no partial confirmation was performed prior to closure of CRCA #4 with ACIT #4 still open.

In response to repetitive leaks of the 21 chiller evaporator head gaskets on December 4 and 9, 2014, PSEG completed an apparent cause evaluation (ACE) 70171934 on February 6, 2015, and assigned extent of condition (EOC) CRCA #1 to replace the evaporator head gaskets on all the remaining chillers. The inspectors noted that gasket replacements continued on all six chillers across both units through October 28, 2015; however ACIT #4 from the RCE still remained open to determine the proper gasket material. The inspectors further noted that many of the gasket replacements were performed using gasket MM Y603504, which was the same hand-cut generic gasket that had failed in the 13 and 21 chillers in August and December 2014, respectively. However, PSEG did not provide any discussion regarding use of MM Y603504 in the RCE, nor in ACE 70171934.

On December 22, 2015, PSEG completed ACE 70181604, in response to chiller divider plate gasket leakage that resulted in unplanned TS limiting condition for operation (LCO) shutdown action statements for the 13 chiller on November 2, 2015; the 21 chiller on November 7, 2015; and the 23 chiller on December 1, 2015. PSEG concluded the apparent cause of the gasket leakage was inadequate gasket design. Specifically, PSEG determined that generic neoprene rubber has poor mechanical properties and

tends to extrude when compressed. The inspectors determined that hand-cut generic neoprene gasket MM Y603504 was installed in each of the 13, 21, 23 and 12 (as described above in the January 4, 2016, event) chillers at the time of the most recent gasket failures. Additionally, ACE 70181604 stated that the RCE ACIT #4 was still open, and created an action to be completed under ACE CRCA #1. Though not discussed by PSEG in the ACE, the inspectors determined, through interviews with the lead evaluator, that PSEG considered gasket MM Y603504 as an acceptable temporary replacement for the failed gaskets in the 13, 21, 23, and 12 chillers, pending completion of ACIT #4 with an original due date of December 2014. PSEG also established enhanced operational performance monitoring of the chillers under order 80115963.

On February 25, 2016, PSEG completed ACIT #4, and concluded that a premium grade neoprene was the proper head gasket material for use in the chilled water system. The inspectors noted it took PSEG approximately 2 months to complete ACIT #4 following completion of ACE 70181604. Therefore, the inspectors determined it would have been reasonable to complete ACIT #4 in a similar time period following the RCE, to support appropriate closure of CRCA #4, and more accurately inform the ACE 70171934 EOC action to replace the gaskets in all the chillers. Through interviews with PSEG maintenance technicians, the inspectors verified the premium grade neoprene material selected by PSEG was commercially available when PSEG closed the RCE CRCA #4 on December 15, 2014. Since completion of ACIT #4, the inspectors noted PSEG installed the premium grade neoprene gaskets in 12 and 23 chillers, respectively. Additionally, in support of evaluating another alternative solution, PSEG installed a new Teflon gasket in 13 chiller, based on a specific template from the evaporator head surface developed under design change request (DCR) 80116209, which will be considered for application in the remaining chillers based on performance monitoring results of the 13 chiller.

Analysis. The inspectors determined that closing a corrective action to correct a CAQ without implementing the corrective action was a performance deficiency. Specifically, PSEG assigned a corrective action to change the chiller evaporator head gasket material, closed the corrective action without changing the gasket material, and continued to perform gasket replacements between January 15 and October 28, 2015, using the same hand-cut generic neoprene material that had previously failed. Consequently, four chillers experienced evaporator head gasket leakage that rendered the chillers inoperable as a result of not having the proper gasket material. The performance deficiency was more than minor because it was associated with the equipment performance attribute of the Mitigating System cornerstone, and adversely affected the cornerstone objective of ensuring the availability and reliability of systems that respond to initiating events to prevent undesirable consequences, in that safety-related chillers were rendered inoperable as a result of not having the proper gasket material. The inspectors determined that this finding screened to Green in accordance with Inspection Manual Chapter (IMC) 0609, Appendix A, because the finding did not represent an actual loss of function of at least a single train for greater than its TS-allowed outage time.

The finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Resolution, because PSEG did not take effective corrective action to

address chiller evaporator head gasket leaks in a timely manner. Specifically, PSEG established a corrective action to address chiller gasket leaks by changing the gasket material, closed the corrective action without changing the material, continued to install the same gasket material that had previously failed, and subsequently experienced additional chiller gasket leaks that rendered the associated chillers inoperable. [P.3]

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI requires, in part, that CAQs are promptly identified and corrected. Contrary to the above, PSEG did not assure that an identified CAQ was corrected. Specifically, PSEG established a corrective action on December 8, 2014, to address safety-related chiller refrigerant leaks by changing the evaporator head gasket material, and closed the corrective action on December 15, 2014, without changing the gasket material. Subsequently to December 15, 2014, four of the six chillers across both units were repaired using gasket material that had previously failed, and between November 2, 2015, and January 4, 2016, these four chillers experienced evaporator head gasket leakage that rendered the chillers inoperable. PSEG entered this issue in the CAP as 20708693, and completed ACE 70181604 on December 21, 2015. Corrective actions from the ACE were completed on February 25, 2016, and included: obtaining the proper gasket material (premium grade neoprene); testing an alternative gasket material (Teflon); and establishing interim performance monitoring under Order 80115963. Because this violation was of very low safety significance (Green), and was entered into PSEG's CAP, this issue is being treated as an NCV consistent with Section 2.3.2 of the Enforcement Policy.  
**(05000272;311/2016001-01, Failure to Correct Chiller Failures due to Gasket Leakage)**

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 6 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that PSEG performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that PSEG personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When PSEG performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the TS requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Unit 1, 12 and 13 SW pumps inoperable on March 15
- Unit 1, Chemical and volume control relief valve leakage and packing leakage on March 22
- Unit 1, 11 CFCU failure to start in low speed on March 30



- Unit 2, 2B EDG breaker failure to close on February 1
- Unit 2, 2A subcooling margin monitor (SMM) failure on February 10
- Common, 2A vital instrument bus inverter failure and dual unit Yellow Risk on January 5

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 4 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions based on the risk significance of the associated components and systems:

- Unit 1, Seismic monitor playback functionality on January 11
- Unit 2, 22 SGFP trip on February 16
- Common, Containment air particulate detection on March 2
- Common, Non-safety related grease in safety related applications on March 9

The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TSs and UFSAR to PSEG's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by PSEG.

b. Findings

Introduction. A self-revealing Green finding (FIN) against procedure CC-AA-103, Configuration Change Control for Permanent Physical Plant Changes, Revision 15, was identified when PSEG did not adequately evaluate a modification's effect on existing design and operating margins. Specifically, an Advanced Digital Feedwater Control System (ADFCS) modification introduced an SGFP over-acceleration trip feature that was not evaluated and resulted in a SGFP trip and auxiliary feedwater (AFW) actuation.

Description. During the Unit 2 refueling outage (2R21) in November 2015, the feedwater control system was upgraded to ADFCS under design change package 80104783. Among the changes, it replaced the local electronic overspeed protection for each SGFP with an electronic overspeed system incorporated into ADFCS. As part of the modification, PSEG conducted ADFCS acceptance testing both during the outage and the reactor startup following the outage.

On February 16, a reactor startup was commenced following a reactor trip on February 14, 2016. As part of the power ascension, PSEG transferred the 22 SGFP steam supply from heating steam to main steam. When operators closed the heating steam supply, the 22 SGFP tripped. The motor-driven AFW pumps started as expected for the trip of a single in-service SGFP (TS 3.3.2.1, function 8.f). PSEG entered S2.OP-AB.CN-0001, Main Feedwater/Condensate System Abnormality, Revision 27, established main feedwater using 21 SGFP, made a report to the NRC via ENS 51738 for the AFW actuation, and entered this in their CAP as 20718519.

PSEG's subsequent investigation and root cause evaluation identified that an over-acceleration (or anticipated overspeed) trip existed in the ADFCS software. When the heating steam supply was reduced, the SGFP governor responded by opening additional low pressure poppets, and ultimately, the high pressure poppet as intended to swap to main steam. The opening of the high pressure poppet resulted in increased SGFP turbine acceleration. Consequently, the 22 SGFP tripped when its acceleration reached an equivalent of 400 rpm in one-third of a second.

PSEG determined that one of the root causes was that the specifications reviewed by PSEG and the vendor in accordance with CC-AA-103 did not identify the addition of the over-acceleration trip feature due to a deficiency in the design change turnover process. The new feature, while included in vendor documentation and drawings (Bus and Specialty I/O Reference Manual, 902947), was not discussed or analyzed in the design change package. Notably, instrumentation and controls technicians had discussed the acceleration overspeed trip during system training as the anticipated trip and overspeed trip setpoints were on the same signal diagram. PSEG planned corrective actions included procedural revisions and removal of the over-acceleration overspeed trip from the Unit 1 ADFCS modification being installed in the spring 2016 refueling outage.

CC-AA-103, steps 4.5.3 and 4.5.10.4 require completion of the Design Attribute Review in CC-AA-102, Design Input and Configuration Change Impact Screening, Revision 26, Attachment 1, to include the effects of the change on existing design and operating margins. That review includes configuration activities such as updating setpoint databases and procedures, a critical digital review, simulator changes, and a failure modes and effects analysis that considers all operation modes and ancillary functions. The critical digital review is performed in accordance with CC-AA-103-1004, Design Considerations for Performing System or Component Upgrades Using Digital Microprocessor Based Technology, Revision 6, and states that "all control actuation and interlocks should be detailed in the system requirements specifications" with respect to software design. The inspectors concluded that inadequate design control resulted in not incorporating a SGFP trip feature into plant procedures and operator training.

Analysis. The inadequate evaluation of the ADFCS modification's effect on existing design and operating margins was a performance deficiency. The issue was determined to be more than minor since it was similar to IMC 0612, Appendix E, example 3.b, in that the design was not correctly translated and resulted in system operation being adversely affected. It was also more than minor since it was associated with the design control attribute (plant modification) of the Initiating Events cornerstone and adversely affected its objective to limit the likelihood of events that upset plant stability and challenge critical

safety functions. Specifically, the ADFCS modification introduced an un-evaluated trip feature that resulted in a trip of the single in-service SGFP, an actuation of AFW, and entry into an Abnormal procedure. The finding was evaluated in accordance with IMC 0609, Attachment 4 and Appendix A, where it was screened to Green since the transient did not result in both a reactor trip and loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition (loss of feedwater).

The finding had a cross-cutting aspect in the area of Human Performance, Change Management, in that leaders use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. Specifically, PSEG did not anticipate, manage, and communicate the effects of the over-acceleration trip addition change in the ADFCS modification to ensure unintended consequences were avoided. [H.3]

Enforcement. CC-AA-103, requires completion of a design attribute review to include evaluation of the effects of the change on existing design and operating margins. Contrary to this, PSEG did not adequately evaluate the ADFCS modification during installation in a refueling outage in November 2015. Consequentially, on February 16, 2016, the single in-service SGFP tripped during a transition from heating steam to main steam on an over-acceleration overspeed signal, an AFW actuation occurred, and PSEG entered an abnormal procedure. This finding does not involve enforcement action because no violation of a regulatory requirement was identified. Because this finding does not involve a violation and is of very low safety significance, it is identified as a FIN. **(05000311/2016-001-02, Inadequate Digital Feedwater Design Change Evaluation)**

1R18 Plant Modifications (71111.18 – 1 sample)

Permanent Modifications

a. Inspection Scope

On January 28, the inspectors evaluated power operated relief valve and block valve fire wrap installation. The inspectors verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. In addition, the inspectors reviewed modification documents associated with the design change. The inspectors also interviewed engineering and operations personnel.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 8 samples)a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold points were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- Unit 1, 12 chiller following inoperability on January 1
- Unit 1, 24 station power transformer tap changer replacement on January 22
- Unit 1, 13 reactor coolant system (RCS) Loop Over-Temperature Delta-Temperature failed indication on February 22
- Unit 1, 13 chiller following planned maintenance on March 11
- Unit 1, 1A EDG following 1R cylinder fuel leak on March 30
- Unit 2, SW accumulator discharge valve, 22SW535, slow stroke time on January 20
- Unit 2, 2A SMM following inoperability on February 11
- Unit 2, 23 CFCU following planned maintenance on March 21

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 6 samples)a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant structures, systems, and components to assess whether test results satisfied TSs, the UFSAR, and PSEG procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

- Unit 1, RCS leakage on January 20
- Unit 1, 1B EDG monthly surveillance run on March 3
- Unit 2, 21 containment spray (CS) pump inservice testing (IST) on January 27

- Unit 2, SMM monthly surveillance testing on February 19
- Unit 2, 24 SW pump IST on March 7
- Unit 2, 2 AFW valve stroke timing (IST) on March 14

b. Findings

No findings were identified.

**Cornerstone: Emergency Preparedness**

1EP6 Drill Evaluation (71114.06 – 1 sample)

Emergency Preparedness Training Observations

a. Inspection Scope

The inspectors observed simulator training evolutions for licensed operators on January 26 and March 8, 2016, which required emergency plan implementation by an operations crew. PSEG planned for these evolutions to be evaluated and included in performance indicator (PI) data regarding drill and exercise performance. The inspectors observed event classification and notification activities performed by the crew. The inspectors also attended the post-evolution critique for the scenario. The focus of the inspectors' activities was to note any weaknesses and deficiencies in the crew's performance and ensure that PSEG evaluators noted the same issues and entered them into the CAP.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstones: Occupational and Public Radiation Safety**

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

a. Inspection Scope

The inspectors reviewed PSEG's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR Part 20, TSs, applicable Regulatory Guides (RGs), and the procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the PIs for the occupational exposure cornerstone, radiation protection (RP) program audits, and reports of operational occurrences in occupational radiation safety since the last inspection.

### Radiological Hazard Assessment

The inspectors conducted independent radiation measurements during walk-downs of the facility and reviewed the radiological survey program; air sampling and analysis; and any changes to plant operations since the last inspection to verify survey adequacy for any new radiological hazards for onsite workers or members of the public.

### Instructions to Workers

The inspectors observed containers of radioactive materials and assessed whether the containers were labeled and controlled in accordance with requirements.

### Risk-Significant High Radiation Areas and Very High Radiation Areas Controls

The inspectors reviewed the procedures and controls for High Radiation Areas (HRAs), Very High Radiation Areas (VHRAs), and radiological transient areas in the plant.

### Contamination and Radioactive Material Control

The inspectors observed the monitoring of potentially contaminated material leaving the radiological controlled area and inspected the methods and radiation monitoring instrumentation used for control, survey, and release of that material.

### Radiological Hazards Control and Work Coverage

The inspectors evaluated in-plant radiological conditions and performed independent radiation measurements during facility walk-downs and observation of radiological work activities. The inspectors assessed whether posted surveys; radiation work permits; worker radiological briefings and RP job coverage; the use of continuous air monitoring, air sampling and engineering controls; and dosimetry monitoring were consistent with the present conditions. The inspectors examined the control of highly activated or contaminated materials stored within the spent fuel pools and the posting and physical controls for selected HRAs, locked HRAs and VHRAs to verify conformance with the occupational PI.

### Risk-Significant HRA and VHRA Controls

The inspectors reviewed the procedures and controls for HRAs, VHRAs, and radiological transient areas in the plant.

### Problem Identification and Resolution.

The inspectors evaluated whether problems associated with radiation monitoring and exposure control (including operating experience) were identified at an appropriate threshold and properly addressed in the CAP.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

The inspectors assessed PSEG's performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements contained in 10 CFR Part 20, applicable RGs, TSs, and procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors conducted a review of PSEG's collective dose history and trends; ongoing and planned radiological work activities; previous post-outage ALARA reviews; radiological source term history and trends; and ALARA dose estimating and tracking procedures.

Radiological Work Planning

The inspectors reviewed planned radiological work activities based on exposure significance. Work activities reviewed included: steam generator work; pressurizer work; reactor cavity work, and scaffolding. For each of these activities, the inspectors reviewed: ALARA work activity evaluations; exposure estimates; exposure reduction requirements; person-hour estimates; and previous post-work reviews to identify lessons learned.

Verification of Dose Estimates and Exposure Tracking Systems

The inspectors reviewed the current annual collective dose estimate; basis methodology; and measures to track, trend, and reduce occupational doses for ongoing work activities.

Source Term Reduction and Control

The inspectors reviewed the current plant radiological source term and historical trend, plans for plant source term reduction, and contingency plans for changes in the source term as the result of changes in plant fuel performance or changes in plant primary chemistry.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with ALARA planning and controls were identified at an appropriate threshold and properly addressed in the CAP.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope

The inspectors reviewed the control of in-plant airborne radioactivity and the use of respiratory protection devices in these areas. The inspectors used the requirements in 10 CFR Part 20, RG 8.15, RG 8.25, NUREG/CR-0041, TS, and procedures required by TS as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the UFSAR to identify ventilation and radiation monitoring systems associated with airborne radioactivity controls and respiratory protection equipment. The inspectors reviewed respiratory protection program procedures and current PIs for unintended internal exposure incidents.

Engineering Controls

The inspectors reviewed operability and use of both permanent and temporary ventilation systems, and the adequacy of airborne radioactivity radiation monitoring in the plant based on location, sensitivity, and alarm set-points.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with the control and mitigation of in-plant airborne radioactivity were identified at an appropriate threshold and addressed by PSEG's CAP.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

a. Inspection Scope

The inspectors reviewed the monitoring, assessment, and reporting of occupational dose. The inspectors used the requirements in 10 CFR Part 20, RGs, TSs, and procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors reviewed: RP program audits and procedures associated with dosimetry operations.



### Source Term Characterization

The inspectors reviewed the plant radiation characterization (including gamma, beta, alpha, and neutron) being monitored. The inspector verified the use of scaling factors to account for hard-to-detect radionuclides in internal dose assessments.

### External Dosimetry

The inspectors reviewed: the use of “correction factors” to align electronic personal dosimeter results with National Voluntary Laboratory Accreditation Program dosimetry results; dosimetry occurrence reports; and CAP documents for adverse trends related to external dosimetry.

### Internal Dosimetry

The inspectors reviewed: adequacy of the program for whole body count monitoring of plant radionuclides or other bioassay technique; adequacy of the program for dose assessments based on air sample monitoring; and the use of respiratory protection.

### Problem Identification and Resolution

The inspectors evaluated whether problems associated with occupational dose assessment were identified at an appropriate threshold and properly addressed in the CAP.

#### b. Findings

No findings were identified.

### 2RS5 Radiation Monitoring Instrumentation (71124.05)

#### a. Inspection Scope

The inspectors reviewed performance in assuring the accuracy and operability of radiation monitoring instruments used to protect occupational workers. The inspectors used the requirements in 10 CFR Part 20; RGs; applicable industry standards; and procedures required by TSs as criteria for determining compliance.

#### Inspection Planning

The inspectors reviewed: the UFSAR; RP audits; records of in-service survey instrumentation; and procedures for instrument source checks and calibrations.

#### Calibration and Testing Program

The inspectors reviewed the current detector calibration and functional testing results for various laboratory instruments including gamma spectroscopy (Detector 4) and alpha

monitors (SAC 4), portal monitors (GEM-5 and ARGOS 5A/B), and small article monitors (CRONOS-4).

#### Instrument Calibrator

The inspectors reviewed the calibration standards used for portable instrument calibrations and response checks to verify that instruments were calibrated by a facility that used National Institute of Science and Technology traceable sources.

#### Calibration and Check Sources

The inspectors reviewed the plant waste stream characterization to assess whether the calibration sources used were representative of the radiation encountered in the plant.

#### Problem Identification and Resolution

The inspectors verified that problems associated with radiation monitoring instrumentation were identified at an appropriate threshold and properly addressed in the CAP.

#### b. Findings

No findings were identified.

### **Cornerstone: Public Radiation Safety (PS)**

#### 2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06)

##### a. Inspection Scope

The inspectors reviewed ground water monitoring. The review was against criteria contained in 10 CFR Part 20, 10 CFR Part 50, 40 CFR Part 190, applicable RGs and industry standards, TSs, Offsite Dose Calculation Manual, and PSEG station procedures for determining compliance.

#### Groundwater Protection Initiative (GPI) Implementation

The inspectors reviewed: on-going evaluations; ground water flow measurements; public dose projections; remediation efforts and minimization of existing contamination; possible sources of contamination; and groundwater characterization. The inspectors reviewed PSEG Ground Water Monitoring Program sample results and sample results from the Salem Unit 1 and Unit 2 seismic gap drains.

The inspectors also conducted visual inspection of the Unit 1 and Unit 2 tell-tale drain areas and associated walls. The inspectors attended an informational meeting where PSEG staff presented the current status of the Unit 1 spent fuel pool leakage and the ground water conditions as established during the past year by pumping, measuring, and monitoring processes that had been previously inspected and reviewed by NRC.

b. Findings and Observations

No findings were identified.

Inspection observations were made in the both Salem Unit 1 and 2 spent fuel pools, the spent fuel pool leak-off troughs, and the seismic gap drains. The reports with photographs of two 4" diameter concrete core bores, 24" and 5" long, taken from the fuel building wall in the vicinity of leakage were examined. The shorter specimen included a portion of the construction joint. Petrographic examination indicated no concrete degradation and the construction joint surfaces appeared unaffected. There were no unexpected conditions observed. The inspectors concluded that the plant staff have continued their efforts to minimize ground water tritium in-flow and have additional steps planned for implementation during the next year.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures (2 samples)

a. Inspection Scope

The inspectors sampled PSEG's submittals for the Safety System Functional Failures PIs for both Units 1 and Unit 2 for the period of January 1, 2015, through December 31, 2015. To determine the accuracy of the PI data reported during those periods, inspectors used definitions and guidance contained in Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, and NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73." The inspectors reviewed PSEG's operator narrative logs, operability assessments, MR records, maintenance WOs, NOTFs, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Reactor Coolant System Specific Activity and Reactor Coolant System Leak Rate (4 samples)

a. Inspection Scope

The inspectors reviewed PSEG's submittal for the RCS specific activity and RCS leak rate PIs for both Units 1 and Unit 2 for the period of January 1, 2015, through December 31, 2015. To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed RCS sample analysis and control room logs of daily measurements of RCS leakage, and compared that information to the data reported by the PI.

Additionally, the inspectors observed surveillance activities that determined the RCS identified leakage rate, and chemistry personnel taking and analyzing an RCS sample.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 1 sample)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, “Problem Identification and Resolution,” the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify PSEG entered issues into their CAP at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into their CAP and periodically attended condition report screening meetings. The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, PSEG performed an evaluation in accordance with 10 CFR 21.

b. Findings

No findings were identified.

.2 Annual Sample: Unit 2 Reactor Trip on Loss of 2H Bus on August 5, 2015

a. Inspection Scope

The inspectors performed an in-depth review of PSEG’s evaluations and corrective actions associated with the reactor trip following the loss of the 2H 4kV bus. PSEG determined the most probable cause was due to a ground fault on the 21 heater drain pump that was not isolated by its associated neutral overcurrent relay. An in-depth review was performed of the associated RCE 70179457, assessing PSEG’s evaluations, extent of condition review, completed and proposed corrective actions and the prioritization and timeliness of actions to evaluate whether the corrective actions were appropriate. The inspectors visually inspected the 2H Bus, the heater drain pumps and portions of the building drains system.

b. Findings and Observations

No findings were identified.

The inspectors determined that PSEG's evaluation and extent of condition review were thorough and the causes appropriately identified. The inspectors also determined that the corrective actions were reasonable.

Shortly after the reactor trip, the 22 SGFP tripped on high discharge pressure. PSEG personnel questioned whether this was an appropriate equipment response to the loss of the feedwater flow path following the expected post-trip feedwater isolation signal. The issue was discussed at a Plant Operations Review Committee (PORC) meeting shortly after the trip. During this meeting, the PORC voted unanimously to approve an associated 21 and 22 SGFP Trip Technical Evaluation. The SGFPs tripped on the same high discharge pressure condition during subsequent reactor trips on February 4 and 14, 2016. The PORC meeting minutes following the February 4, 2016, trip indicated that the SGFP trips were unexpected and that engineering staff would evaluate this. Inspectors engaged in discussions with the PSEG to better understand the effects of the digital feedwater control system on the pumps. Through these discussions, PSEG identified that the technical evaluation on the SGFP trip issue, referenced in the August 7, 2015, PORC Meeting Minutes, had not yet been performed. PSEG generated NOTFs 20698987 and 20717374 to ensure a technical evaluation is completed. It is noted that a new ADFCS replaced the existing digital feedwater control system in the fall 2015 refueling outage.

The inspectors walked down the turbine building to evaluate whether significant building drain system leakage, experienced several weeks prior to the failure of 21 Heater Drain Pump motor, may have contributed to its failure. During that walkdown, numerous issues related to building drain deficiencies and house-keeping associated with severe weather preparations were identified and subsequently communicated to PSEG management. PSEG wrote NOTF 20727505 to address the drain system and housekeeping observations. Inspectors also questioned inconsistencies between heater drain pump motors reservoir oil levels, the sight glass normal level annotations, and the oil level specification sheets. PSEG captured this issue in their CAP as NOTF 20717080.

All of these issues screened to minor in accordance with IMC 0612, Appendix B, because the issues did not adversely affect any of the cornerstone objectives.

#### 4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 – 5 samples)

##### .1 Plant Events (2 samples)

###### a. Inspection Scope

For the plant events listed below, the inspectors reviewed and/or observed plant parameters, reviewed personnel performance, and evaluated performance of mitigating systems. The inspectors communicated the plant events to appropriate regional personnel, and compared the event details with criteria contained in IMC 0309, "Reactive Inspection Decision Basis for Reactors," for consideration of potential reactive inspection activities. As applicable, the inspectors verified that PSEG made appropriate emergency classification assessments and properly reported the event in accordance with 10 CFR

50.72 and 50.73. The inspectors reviewed PSEG's follow-up actions related to the events to assure that PSEG implemented appropriate corrective actions commensurate with their safety significance.

- Unit 2, reactor trip from main turbine trip on February 4
- Unit 2, reactor trip from main turbine trip on February 14

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report 05000311/2015-002-00: Reactor Trip Due to Loss of 4kV Non-Vital Group Bus

a. Inspection Scope

On August 5, 2015, the Unit 2 reactor tripped due to a trip of the 21 reactor coolant pump when the 2H 4kV bus infeed breaker opened. PSEG completed an RCE but did not identify a definitive cause. PSEG determined the most probable cause was due to a ground fault on the 21 heater drain pump that was not isolated by its associated neutral overcurrent relay. The event was reportable under 10 CFR 50.73(a)(2)(iv)(A) as an event that resulted in an automatic actuation of the reactor protection system and actuation of the AFW system. The inspector's reviewed the Licensee Event Report (LER), PSEG's RCE and corrective actions, and interviewed PSEG staff. This LER is closed. Inspection report section 4OA2.2 documents further inspection of this issue.

b. Findings

No findings were identified.

.3 (Closed) LER 05000272/2015-005-00: Low Containment Spray Additive Tank Sodium Hydroxide Concentration

a. Inspection Scope

On June 22, 2015, Salem Unit 1 entered TS action statement 3.6.2.2.a when the CS additive tank sodium hydroxide (NaOH) concentration was discovered to be 29.6 percent by weight during chemistry sampling under surveillance requirement 4.6.2.2.b, which is below the TS-required value of between 30 and 32 percent weight of NaOH solution. With the Spray Additive System inoperable, action was required to restore the system to operable status within 72 hours, or be in at least hot standby within the next 6 hours. PSEG's review of past CS additive tank level versus estimated NaOH concentration by weight indicated that the NaOH concentration in the tank had decreased below the TS required range of between 30 and 32 percent by weight value in January of 2015, based on dilution from in-leakage, and therefore exceeded the TS-allowed outage time of 72 hours. PSEG reported this event as an LER in accordance with 50.73(a)(2)(i)(B) for a condition prohibited by TS, and 50.73(a)(2)(v)(C) and (D) for any event or condition

that could have prevented the fulfillment of the safety function of systems that are needed to (C) control the release of radioactive materials or (D) mitigate the consequences of an accident. On June 23, 2015, following chemical addition, NaOH concentration was verified to be 31.4 percent by weight NaOH, and Salem Unit 1 exited TS action statement 3.6.2.2.a. The inspectors reviewed the LER, the associated ACE, and interviewed PSEG staff. This LER is closed.

b. Findings

A PSEG-identified violation is documented in Section 4OA7 of this report.

.4 (Closed) LER 05000272/2015-007-01: Inoperable Control Room Emergency Air Conditioning System Due to Failed Charcoal Filter Surveillance Test

a. Inspection Scope

On October 28, 2015, Salem Unit 1 was in Mode 1 and Unit 2 was in Mode 6 with fuel movement in progress. The Unit 1 Control Room Emergency Air Conditioning System (CREACS) train was in single train filtration mode supplying air to the common Control Room due to outage activities on Unit 2. At 6:28 a.m., the Unit 1 CREACS train was declared inoperable due to failure of its charcoal filter surveillance test, resulting in both units CREACS trains being inoperable. Unit 1 entered TS 3.0.3 and Unit 2 suspended fuel movement to comply with TS 3.7.6.c. At 9:50 a.m., the Unit 2 CREACS train was returned to service and aligned to single train filtration mode supplying air to the common Control Room. Unit 1 exited TS 3.0.3, meeting the requirement of TS 3.7.6.1.a, to restore a single train of CREACS to operable status. This event was caused by less than adequate procedure guidance and ownership of the surveillance activity by the maintenance shop responsible for performing the work. The direct cause of the TS entry was the filter failure due to aging. This event was reportable under 10 CFR 50.73(a)(2)(i)(B), as a condition prohibited by TSs, and 10 CFR 50.73(a)(2)(v)(D), as a condition that could have prevented the fulfillment of a safety function. The inspectors reviewed the LER, the associated cause evaluation, and interviewed PSEG staff. This LER is closed.

b. Findings

Introduction. A self-revealing Green NCV of 10 CFR Part 50, Appendix B, Criterion XVI, was identified when PSEG did not promptly identify and correct a condition adverse to quality (CAQ). Specifically, PSEG did not promptly identify that negative results of a CREACS charcoal filtration sample had TS implications and correct it prior to violating Units 1 and 2 TS 3.0.3 and Unit 2 TSs 3.0.4 and 3.7.6.

Description. CREACS is a subset of control area ventilation (CAV) that is designed to maintain the control area temperatures within limits and permit continuous occupancy under design accident conditions by protecting areas from infiltration of fire, smoke, or airborne radioactivity. Units 1 and 2 both have a CREACS filter unit that includes

high-efficiency particulate air and charcoal filters. Unit 1 TS 3.7.6.1 and Unit 2 TS 3.7.6 cover CREACS and Units 1 and 2 surveillance requirements 4.7.6.1.b.3 and 4.7.6.1.c respectively require that PSEG verify the charcoal adsorber methyl iodide penetration does not exceed 2.5 percent within 31 days after a sample has been drawn. PSEG staff removed a charcoal filter from the Unit 1 CREACS on October 7, 2015, under work order 50166763 and sent it to a vendor for analysis. On October 21, the vendor concluded that the testing results were unsatisfactory and sent PSEG an email on October 22 at 6:43 p.m. On October 27, a PSEG maintenance supervisor unsuccessfully attempted to contact on-shift senior reactor operators, but did make contact and informed the refueling outage maintenance execution team at approximately 6:30 p.m. At 6:28 a.m. on the following day, the Unit 1 control room operators were notified of the issue who then declared Unit 1 CREACS inoperable. Unit 2 CAV had been inoperable since October 22 at 3:06 p.m., due to the ongoing refueling outage, and Unit 1 CAV was in service in the maintenance mode (a single filtration alignment) via TS 3.7.6.1.a action a. With both CREACS filters inoperable, PSEG entered Unit 1 TS 3.0.3, suspended irradiated fuel movements on Unit 2 to comply with Unit 2 TS 3.7.6, and commenced actions to re-align CAV to Unit 2 supplying in the maintenance mode. Unit 1 TS 3.0.3 was exited at 7:55 a.m. that morning and PSEG reported this via an 8-hour report to the NRC under ENS 51504.

PSEG documented the issue in their CAP as NOTFs 20707922, 20707650, and 20712068. Under an associated work group evaluation (70181728), PSEG analysis determined that the cause was less than adequate procedure guidance and surveillance activity ownership. Additionally, there had been a declining trend in performance during prior performances of this test. Specifically, prior test results were 1.493 percent in 2011, 1.971 percent in 2013, 2.108 percent in 2014, and 3.054 percent in 2015. Further, the test acceptance criterion left no margin to the TS limit. PSEG revised the associated surveillance procedure to write a NOTF to replace the charcoal bank in the next system window if methyl iodide results are greater than or equal to 2 percent penetration (0.5 percent margin).

With Units 1 and 2 in Modes 1 through 4, and two filtration units inoperable, TS 3.0.3 requires the respective unit to be in Hot Standby within 6 hours. The TS applied to both units from October 22 at 6:43 p.m. until exited on Unit 1 on October 28, and October 24 at 2:41 a.m. on Unit 2 when that plant entered Mode 5. Additionally, Unit 2 TS 3.0.4 requires that when an LCO is not met, entry into a Mode or other specified condition in the applicability shall only be made when actions permit continued operation, an allowance is stated, or a risk assessment is completed. Unit 2 TS 3.7.6.c requires the suspension of irradiated fuel movement when two filtration trains are inoperable. Unit 2 commenced the movement of irradiated fuel assemblies on October 27 at 3:00 p.m. Inspectors determined that inadequate identification and correction of a CAQ (i.e. unsatisfactory filter performance), was a performance deficiency that led to violating Units 1 and 2 TS 3.0.3 and Unit 2 TSs 3.0.4 and 3.7.6. Specifically, PSEG staff neither entered the issue into their CAP nor informed the control room of the unsatisfactory test results in a timely manner. This resulted in a delay in taking corrective actions both regarding the unsatisfactory charcoal filters and avoidance of placing the units in conditions prohibited by TSs. Had the results been reviewed and communicated on the



day they were provided to PSEG, Unit 2 CAV would have been in service and the TS violations would have been avoided.

Analysis. Untimely identification and correction of the charcoal filter performance was a performance deficiency. The issue was determined to be more than minor since it was similar to IMC 0612, Appendix E, example 2.a in that a TS limit was exceeded. Further, it was more than minor since it was associated with the system performance attribute of the Barrier Integrity cornerstone and adversely affected its cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, unsatisfactory charcoal filter performance resulted in inoperability of the single filtration train that was in service. The finding was reviewed in accordance with IMC 0609, Attachment 4 and Appendix A, where it was screened to Green since it only represented a degradation of the radiological barrier function provided for the control room.

The finding had a cross-cutting issue in Human Performance, Teamwork, in that individuals and work groups communicate and coordinate their activities within and across organizational boundaries to ensure nuclear safety is maintained. Specifically, PSEG staff did not collaborate and cooperate in connection with operational activities, such as CAP entry and notification of the control room, associated with the CREACS filter testing and results. [H.4]

Enforcement. Title 10 CFR Part 50, Appendix B, Criterion XVI, states, in part, that conditions adverse to quality are promptly identified and corrected. Contrary to this, from October 22 to 28, PSEG staff did not promptly identify and correct unsatisfactory charcoal filter test results. Consequently, PSEG did not declare the Unit 1 CREACS inoperable in a timely manner and resulted in a violation of Units 1 and 2 TS 3.0.3 and Unit 2 TSs 3.0.4 and 3.7.6. PSEG suspended irradiated fuel movements on Unit 2, re-aligned Unit 2 CAV to exit the TSs approximately an hour later, entered this in their CAP as NOTFs 20707922, 20707650, and 20712068, completed an evaluation, and revised an associated surveillance procedure to write a NOTF to replace the charcoal bank in the next system window if methyl iodide results are greater than or equal to 2 percent penetration (0.5% margin). Because the finding was of very low safety significance (Green) and was entered into PSEG's CAP, this issue is being treated as an NCV consistent with Section 2.3.2 of the NRC's Enforcement Policy.

**(05000272/2016001-03, Untimely Identification and Correction of Unsatisfactory Control Room Ventilation Charcoal Testing)**

#### 4OA6 Meetings, Including Exit

On April 27, 2016, the inspectors presented the inspection results to Mr. John Perry, Salem Site Vice President, and other members of the PSEG staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report. PSEG management acknowledged and did not dispute the findings.

**4OA7 Licensee-Identified Violations**

The following violation of very low safety significance (Green) was identified by PSEG and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy, for being dispositioned as an NCV.

- TS LCO action statement 3.6.2.2.a requires that with the spray additive system inoperable, action shall be taken to restore the system to operable status within 72 hours, or be in at least hot standby within the next 6 hours. Contrary to the above, on June 22, 2015, PSEG determined that the spray additive system was inoperable for a period of time greater than allowed by TS. Specifically, PSEG review of past CS additive tank level versus estimated NaOH concentration by weight indicated that the NaOH concentration in the tank had decreased below the TS limit of 30 percent by weight on January 15, 2015, based on dilution from in-leakage. On June 23, 2015, following chemical addition, NaOH concentration was verified to be 31.4 percent by weight NaOH, and Salem Unit 1 exited TS action statement 3.6.2.2.a. PSEG reported this event as an LER, as documented in Section 4OA3 of this report. The inspectors determined that the finding was of very low safety significance (Green) in accordance with Section A of Exhibit 2 in Appendix A of IMC 0609, "The Significance Determination Process for Findings at Power," because PSEG determined under ACE 70178077 that design calculations confirmed the spray additive system will perform its safety function within the range of 28 to 36 percent by weight NaOH solution. Because this finding is of very low safety significance and has been entered into PSEG's CAP under NOTF 20694465, this violation is being treated as a Green NCV consistent with the NRC Enforcement Policy.

**ATTACHMENT: SUPPLEMENTARY INFORMATION**

**SUPPLEMENTARY INFORMATION**

**KEY POINTS OF CONTACT**

Licensee Personnel

J. Perry, Site Vice President  
E. Carr, Plant Manager, Salem  
S. Boesch, System Engineer  
T. Cachaza, Senior Regulatory Compliance Engineer  
R. Cary, Environmental Coordinator  
D. Denelsbeck, RP Support Supervisor  
F. Grenier, RP Supervisor, Dosimetry  
B. Hendrickson, Engineering Design Manager  
A. Kraus, Manager, Nuclear Environmental Affairs  
W. Leeds, Chief Technician – Mechanical  
P. Martitz, Technical Support Superintendent  
R. Mitchell, Work Week Manager  
J. Myers, Senior Reactor Operator  
G. Pahwa, Senior Engineer  
M. Pennington, System Engineer  
M. Phillips, Regulatory Assurance  
S. Speer, License Renewal  
J. Tutterow, System Engineer  
C. Wend, Radiation Protection Manager  
M. Widner, Work Week Manager  
W. Wikoff, Program Engineer  
L. Wu, NSSS Engineer  
A. Zhang, NSSS Engineer

**LIST OF ITEMS OPENED, CLOSED AND DISCUSSED**Open and Closed

05000272/2016001-01	NCV	Failure to Correct Chiller Failures due to Gasket Leakage (Section 1R12)
05000311/2016001-02	FIN	Inadequate Digital Feedwater Design Change Evaluation (Section 1R15)
05000272/2016001-03	NCV	Untimely Identification and Correction of Unsatisfactory Control Room Ventilation Charcoal Testing (Section 4OA3.4)

Closed

05000311/2015002-00	LER	Reactor Trip Due to Loss of 4kV Non-Vital Group Bus (Section 4OA3.2)
05000272/2015005-00	LER	Low Containment Spray Additive Tank Sodium Hydroxide Concentration (Section 4OA3.3)
05000272/2015007-01	LER	Inoperable Control Room Emergency Air Conditioning System Due to Failed Charcoal Filter Surveillance Test (Section 4OA3.4)

**LIST OF DOCUMENTS REVIEWED****Section 1R01: Adverse Weather Protection**Procedures

OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 13  
 SC.OP-AB.ZZ-0001, Adverse Environmental Conditions, Revision 18

Notifications

20716386      20716387      20716625      20717120

**Section 1R04: Equipment Alignment**Procedures

S2.OP-SO.CH-0001 (Q), Chilled Water System Operation, Revision 32

Notifications

20537624	20589852	20628545	20690047	20712555	20720163
20722390	20722391				

**Section 1R05: Fire Protection**

Procedures

FP-SA-1562, Pre-Fire Plan Unit 1 Auxiliary Building Ventilation Units, Revision 0  
 FP-SA-1563, Pre-Fire Plan Unit 1 Auxiliary Building Volume Control & Boric Acid Tanks, Revision 0  
 FP-SA-1544, Pre-Fire Plan Unit 1 Auxiliary Building Charging Pump and Spray Additive Tank, Area, Revision 0  
 FP-SA-1546, Pre-Fire Plan Unit 1 Electrical Penetration Area, Revision 0  
 FP-SA-2546, Pre-Fire Plan Unit 2 Electrical Penetration Area, Revision 0  
 FP-SA-1531, Pre-Fire Plan Unit 1 4160V Switchgear and Battery Rooms, Revision 0

Notifications

20717115	20717117	20719939*	20720265*	20720539*	20721475*
20721698*	20722800*	20723246*	20723830*		

\* Indicates NRC-identified

**Section 1R06: Flood Protection Measures**

Procedures

OP-SA-108-115-1001, Operability Assessment and Equipment Control Program, Revision 8

Notifications

20385709	20715200	20716065
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Maintenance Orders/Work Orders

60090753

Other

UFSAR 3.6.5.12.5

**Section 1R07: Heat Sink Performance**

Procedures

S1.MD-PM.CC-0003, 12 Component Cooling Heat Exchanger, Revision 9  
 ER-AA-340-1002, Service Water Heat Exchanger and Component Inspection Guide, Revision 6

Maintenance Orders/Work Orders

30277416

### **Section 1R11: Licensed Operator Requalification Program**

#### Procedures

S2.OP-AB.CA-0001, Loss of Control Air, Revision 20  
 S2.OP-AR.ZZ-0005, Overhead Annunciators Window E, Revision 21  
 2-EOP-TRIP-1, Reactor Trip or Safety Injection, Revision 30  
 2-EOP-SGTR-1, Steam Generator Tube Rupture, Revision 30  
 SC.OP-AB.ZZ-0001, Adverse Environmental Conditions, Revision 18

#### Notifications

20594345      20716427

#### Other Documents

S-ESG-1601, Simulator Training Scenario, Revision 0

### **Section 1R12: Maintenance Effectiveness**

#### Notifications

20685040      20690601      20690796      20691465      20721126      20722357\*

#### Maintenance Orders/Work Orders

70169007      70171934      70179986      70183292

#### Evaluations

70120968      70175635      70177088

#### Design Change

80110440

#### Other Documents

VTD 325458

### **Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

#### Procedures

SC.MD-CM.115-0001, 10/12 KVA Uninterruptible Power Supply Troubleshooting and Repair,  
 Revision 17  
 S2.OP-SO.RC-0004(Q), Identifying and Measuring Leakage, Revision 15

#### Notifications

20715332      20715511      20718380      20718559      20721683      20721898  
 20721907      20721907      20721963\*      20722465      20722466

#### Maintenance Orders/Work Orders

60127315

#### Other Documents

Troubleshooting Log for WO 20721898 – S1CVC-1CV141

### **Section 1R15: Operability Determinations and Functionality Assessments**

#### Notifications

20418823    20719597    20719614    20720969    20721209\*    20721343  
20722132\*

#### Evaluations

70125818    70184400    70184741    70184748

### **Section 1R18: Plant Modifications**

#### Procedures

S1.OP.AB-CR-0002, Control Room Evacuation Due to Fire in the Control Room, Relay Room, 460/230V Switchgear Room, or 4kV Switchgear Room, Revision 27

#### Notifications

20700943

#### Maintenance Orders/Work Orders

70179579

#### Drawings

205301, Sheet 1, Reactor Coolant, Revision 59

### **Section 1R19: Post-Maintenance Testing**

#### Procedures

2-EOP-CFST-1, Critical Safety Function Status Trees, Revision 31  
SC.MD-CM.DG-0015, Fuel Injection Pump Fuel Header Supply Tube Removal and Installation, Revision 12  
MA-AA-716-012, Post Maintenance Testing, Revision 20  
MA-AA-716-230-1009, Electrical testing of AC Motors, Revision 6

#### Notifications

20717079\*    20717914

#### Maintenance Orders/Work Orders

60121188    60127320    60128719

### **Section 1R22: Surveillance Testing**

#### Procedures

S1.OP-ST.DG-0002, 1B Diesel Generator Surveillance Test, Revision 48  
S1.OP-SO.DG-0002, 1B Diesel Generator Operation, Revision 40

#### Notifications

20713378    20713941    20719039\*    20719245\*    20721003\*    20723255\*  
20723854\*

### **Section 1EP6: Drill Evaluation**

#### Procedures

S2.OP-AB.CA-0001, Loss of Control Air, Revision 20  
S2.OP-AR.ZZ-0005, Overhead Annunciators Window E, Revision 21  
2-EOP-TRIP-1, Reactor Trip or Safety Injection, Revision 30  
2-EOP-SGTR-1, Steam Generator Tube Rupture, Revision 30  
SC.OP-AB.ZZ-0001, Adverse Environmental Conditions, Revision 18

#### Notifications

20594345      20716427

#### Other Documents

S-ESG-1601, Simulator Training Scenario, Revision 0

### **Section 2RS1: Access Control to Radiologically Significant Areas**

#### Procedures

RP-AA-301, Radiological Air Sampling Program, Revision 6  
RP-AA-460, Control for High and Very High Radiation Areas, Revision 17  
RP-AA-463, High Radiation Area Key Control, Revision 4  
RP-AA-401-1001, Special Instruction for Highly Radioactive In-core Components, Revision 0  
RP-SA-103, Radiological Control of Reactor Cavity and Spent Fuel Pool Operations, Revision 1  
NF-AA-430, Failed Fuel Action Plan, Revision 8  
CY-AP-120-1030, Estimating RCS Crud Release for Refueling Outage, Revision 1  
RP-AA-401, Operational ALARA Planning and Control, Revision 13  
S1.CH-IO.ZZ-111, Salem Unit 1 Shutdown Chemistry Plan, Revision 8

#### Other Documents

##### Audits

Locked High Radiation Key Inventory Logs  
Radiation Protection Job Guides (7 through 14)  
Radiological Survey data (various)  
Radiation Protection Plant Radionuclide Evaluation  
Corrective Action Documents (various Notifications)

### **Section 2RS2: Occupational ALARA Planning and Controls**

#### Procedures

CY-AP-120-1030, Estimating RCS Crud Release for Refueling Outage, Revision 1  
RP-AA-401, Operational ALARA Planning and Control, Revision 13  
S1. CH-IO.ZZ-111, Salem Unit 1 Shutdown Chemistry Plan, Revision 8



Other Documents

Refueling Outage Radiological Performance Report  
ALARA Plans (various)  
Radiation Protection Job Guides (7 through 14)  
Outage Chemistry Control Plan  
1R24 Hard Gamma Projection  
Corrective Action Documents (various Notifications)

**Section 2RS3: In-plant Airborne Radioactivity Control and Mitigation**

Procedures

RP-AA-301, Radiological Air Sampling Program, Revision 6  
RP-AA-220, Annual Bioassay Review, Revision 9  
RP-AA-401, Operational ALARA Planning and Control, Revision 13  
RP-SA-103, Radiological Control of Reactor Cavity and Spent Fuel Pool Operations, Revision 1  
NF-AA-430, Failed Fuel Action Plan, Revision 8

Other Documents

Radiological Source Term Data – 10 CFR 61 waste stream report  
Airborne Radioactivity Sampling Results (various)  
Corrective Action Documents (various Notifications)

**Section 2RS4: Occupational Dose Assessment**

Procedures

RP-AA-220, Annual Bioassay Review, Revision 9  
RP-AA-401, Operational ALARA Planning and Control, Revision 13

Other Documents

Radiation Protection Job Guides (7 through 14)  
General Source Term Data  
Corrective Action Documents (various Notifications)

**Section 2RS5: Radiation Monitoring Instrumentation**

Procedures

RP-AA-301, Radiological Air Sampling Program, Revision 6  
RP-AA-504, Routine Operation of the Radiation Protection Gross Counting Facility  
NC.RS.TI.ZZ-0552, Calibration of the Ludlum Model 3030 P Alpha and Beta Sample Counter, Revision 1  
NC.RS-TI.ZZ-0519, Calibration of the Eberline Model SAC-4 Alpha Counter, Revision 4  
NC.RS-TI.ZZ-0570, Calibration of Model AMS-4, Beta Particulate Air Monitor, Revision 2  
NC.CH-RC.ZZ-2525, Gamma Spectroscopy Analysis Using CAS, Revision 5

Other Documents

Passive Monitoring Study

Instrument Calibration Records (Gem 5 Portal Monitor, Argos 5A/B Portal Monitor, Chronos 4 tool monitor)

Corrective Action Documents (various notifications)

**Section 2RS6: Radioactive Gaseous and Liquid Effluent Treatment**

Procedures

NC.CH-AP.ZZ-8010 Implementation of the of NRC Bulletin 80-10

Other Documents

Salem License Renewal Commitment, dated May 8, 2014

Safety Evaluation SGS/M-SE-057, dated September 24, 1980

Spent Fuel Concrete Core Bore data

Ground water Monitoring Data

Corrective Action Documents (various Notifications)

**Section 4OA1: Performance Indicator Verification**

Other

LER 05000272/2015001-02

Units 1 and 2, RCS Unidentified Leakage Rate spreadsheets for 2015

Units 1 and 2, Reactor Coolant System Identified Leakage and Activity results for 2015

**Section 4OA2: Problem Identification and Resolution**

Procedures

Adverse Condition Monitoring and Contingency Plan ACM 14-015, Revisions 9 and 13

Plant Operations Review Committee Meeting Minutes, Meeting S2015-019

Plant Operations Review Committee Meeting Minutes, Meeting S2016-003

Prompt Investigation into August 5, 2015 Salem Unit 2 Reactor Trip

Root Cause Evaluation – 2H Bus Tripped

Notifications

20698719	20716820*	20717080*	20717245*	20717864*	20717682*
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20718131	20718133*	20718366*	20722243*	20724678*	20724743*
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Maintenance Orders/Work Orders

70174924	70171710	70179457
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**Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion**

Notifications

20707650	20707922	20712068	20716808	20719333*	20719334*
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20721270\*

Maintenance Orders/Work Orders  
30096788

Evaluations  
70180961      70181728      70182531

### LIST OF ACRONYMS

ACE	Apparent Cause Evaluation
ACIT	Action Tracking Item
ADAMS	Agencywide Documents Access and Management System
ADFCS	Advanced Digital Feedwater Control System
AFW	Auxiliary Feedwater
ALARA	As Low As Is Reasonably Achievable
CAP	Corrective Action Program
CAQ	Condition Adverse To Quality
CAV	Control Area Ventilation
CC	Component Cooling
CFCU	Containment Fan Cooler Unit
CFR	Code of Federal Regulations
CRCA	Corrective Action(s)
CREACS	Control Room Emergency Air Conditioning System
CS	Containment Spray
EDG	Emergency Diesel Generator
EOC	Extent of Condition
FIN	Finding
GPI	Groundwater Protection Initiative
HRA	High Radiation Area(s)
HX	Heat Exchanger
IMC	Inspection Manual Chapter
IST	Inservice Testing
Kv	Kilovolt
LCO	Limiting Condition for Operation
LER	Licensee Event Report
MR	Maintenance Rule
Naoh	Sodium Hydroxide
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NOTF	Notification(s)
NRC	Nuclear Regulatory Commission
OOS	Out Of Service
PI	Performance Indicator
PI&R	Problem Identification & Resolution
PORC	Plant Operations Review Committee
PSEG	Public Service Enterprise Group Nuclear LLC
RCE	Root Cause Evaluation
RCS	Reactor Coolant System

RG	Regulatory Guide(s)
RP	Radiation Protection
SDP	Significance Determination Process
SGFP	Steam Generator Feedwater Pump
SMM	Subcooling Margin Monitor
SW	Service Water
TS	Technical Specification(s)
UFSAR	Updated Final Safety Analysis Report
VHRA	Very High Radiation Area(s)
WO	Work Order(s)