UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

March 9, 2021

Mr. Eric Carr
President and Chief Nuclear Officer
PSEG, Nuclear LLC
PO Box 236
Hancock's Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION UNITS 1 AND 2 – TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000272/2021010 AND 05000311/2021010

Dear Mr. Carr:

On February 12, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Salem Nuclear Generating Station Units 1 and 2 and discussed the results of this inspection with Mr. Charles V. McFeaters, Senior Vice President of Nuclear Operations and other members of your staff. The results of this inspection are documented in the enclosed report.

One finding of very low safety significance (Green) is documented in this report. This finding involved a violation of NRC requirements. We are treating this violation as a non-cited violation (NCV) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violation or the significance or severity of the violation documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Salem Nuclear Generating Station Units 1 and 2.

If you disagree with a cross-cutting aspect assignment 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 U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; and the NRC Resident Inspector at Salem Nuclear Generating Station Units 1 and 2.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

X /RA/

Signed by: Glenn T. Dentel

Glenn T. Dentel, Chief
Engineering Branch 2
Division of Reactor Safety

Docket Nos. 05000272 and 05000311
License Nos. DPR-70 and DPR-75

Enclosure:
As stated

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SUBJECT: SALEM NUCLEAR GENERATING STATION UNITS 1 AND 2 – TRIENNIAL FIRE PROTECTION INSPECTION REPORT 05000272/2021010 AND 05000311/2021010 DATED MARCH 9, 2021

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	05000272 and 05000311
License Numbers:	DPR-70 and DPR-75
Report Numbers:	05000272/2021010 and 05000311/2021010
Enterprise Identifier:	I-2021-010-0013
Licensee:	PSEG, Nuclear LLC
Facility:	Salem Nuclear Generating Station Units 1 and 2
Location:	Hancock's Bridge
Inspection Dates:	January 25, 2021 to February 12, 2021
Inspectors:	L. Dumont, Team Leader E. Dipaolo, Senior Reactor Inspector M. Patel, Senior Reactor Inspector
Approved By:	Glenn T. Dentel, Chief Engineering Branch 2 Division of Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting a triennial fire protection inspection at Salem Nuclear Generating Station Units 1 and 2, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

Failure to Conduct Adequate Electrical Penetration Seal Inspections			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000272,05000311/2021010-01 Open	[H.1] - Resources	71111.21N.05
The team identified a finding of very low safety significance (Green) involving a non-cited violation (NCV) of Unit 1 Facility Operating License (FOL) Condition 2.C.(5) and Unit 2 FOL Condition 2.C.(10) for failure to implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR) and as approved by the NRC. Specifically, PSEG failed to adequately conduct inspections of fire penetration seals in accordance with the inspection procedure as described in the UFSAR. As a result, degradation, which required repair, was not identified on a Unit 1 and a Unit 2 fire penetration seal during their last performed inspections in April 2013 and February 2018, respectfully.			

Additional Tracking Items

None.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), inspectors were directed to begin telework. In addition, regional baseline inspections were evaluated to determine if all or portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP. However, all the inspection activities were performed onsite.

REACTOR SAFETY

71111.21N.05 - Fire Protection Team Inspection (FPTI)

Structures, Systems, and Components (SSCs) Credited for Fire Prevention, Detection, Suppression, or Post-Fire Safe Shutdown Review (IP Section 03.01) (4 Samples)

The inspectors verified that components and/or systems will function as required to support the credited functions stated for each sample.

(1) Fire Protection Water Supply System, including fire pumps and tanks
(2) Emergency Diesel Generator (EDG) including EDG bypass switches
(3) Chemical and Volume Control System (CVCS), including applicable time critical operator actions
(4) Fire Prevention System (portion), penetration seals

Fire Protection Program Administrative Controls (IP Section 03.02) (2 Samples)

The inspectors verified that the selected processes are implemented in accordance with the licensee's current licensing basis.

(1) Combustible Control Program
(2) Fire Watch, including Fire Protection Impairment Program

Fire Protection Program Changes/Modifications (IP Section 03.03) (2 Samples)

The inspectors verified the following changes to the approved fire protection program do not constitute an adverse effect on the ability to safely shutdown.

(1) Modification package 80122088 - Reroute 2CVAC39B-CT for Appendix R

(2) Modification package 70186439 - GL 86-10 Evaluation for Acceptability of Operator Actions in the MCR.

INSPECTION RESULTS

<table>
<tr><td colspan="4">Failure to Conduct Adequate Electrical Penetration Seal Inspections</td></tr>
<tr><td>Cornerstone</td><td>Significance</td><td>Cross-Cutting Aspect</td><td>Report Section</td></tr>
<tr><td>Mitigating Systems</td><td>Green
NCV 05000272,05000311/2021010-01
Open</td><td>[H.1] - Resources</td><td>71111.21N.05</td></tr>
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<tr><td colspan="4">Description:

During walkdowns of fire area (FA) electrical penetration seals, the team observed a gap and cracks on Unit 1 electrical penetration seal S1FBR-F-15403-048A and a through-seal gap on Unit 2 electrical penetration seal S2FBR-F-25403-072B. The seals were composed of silicone elastomer (Type Be [SF-60]). The cracks and gaps were observed on one of the four sides of the rectangular seal where the seals met up with an alumina-silica board. The alumina-silica board separated each seal from the adjacent seal that penetrated the floor of the Units 1 and 2 460V/230V Switchgear Rooms (1FA-AB-84A and 2FA-AB-84A) down to the Units 1 and 2 4160V Switchgear Rooms (1FA-AB-64A and 2FA-AB-64A). The use of the alumina-silica board to form multiple seals through the concrete floor opening was necessary to limit the size of each seal to within their qualified and tested size.

The team reviewed the fire barrier penetration seal inspection process required by inspection procedure SC.FP-SV.FBR-0026(Q), Flood and Fire Barrier Penetration Seal Inspection, Revision 7. Step 5.3.6 required a general inspection of each seal to verify operability, by visually observing for the “as-designed condition.” The step required that each fire barrier assembly exposed surface shall be visually inspected. One of the specific criteria listed to inspect for included “signs of material shrinkage or separation from walls and components”.

According to PSEG, the penetration seals were installed in the early 1990’s. Based on the observed acceptable condition of the seals with the exception of the side of the seals that met up with the alumina-silica board, it was the team’s engineering judgement that the degradation was not age-related. Based on this, the team concluded that unsatisfactory degradation existed during the last performance of the test (April 2013 for S1FBR-F-15403-048A and February 2018 for S2FBR-F-25403-072B) and that the inspections were inadequately conducted to verify the “as-designed condition” of the seals.

Corrective Actions: The licensee entered the issue into the corrective action program as Notifications (NOTFs) 20868817 and 20868818, declared the seals nonfunctional, and</td></tr>
</table>

established appropriate compensatory measures. PSEG promptly performed an extent-of-condition review of accessible penetration seals in FAs 1/2FA-AB-64 and 1/2FA-AB-84. PSEG identified similar degradation on seals S1FBR-F-15403-048B and S2FBR-F-25403-072A that were adjacent to degraded seals that the team identified as degraded (i.e., S1FBR-F-15403-048A and S2FBR-F-25403-072B). Through-seal gaps were also identified on the side of the seal where the seal material met up with the alumina-silica board. This was entered into the CAP as NOTFs 20869325 and 20969326. PSEG also confirmed that the Unit 1 apparent gap identified by the team on penetration seal S1FBR-F-15403-048A was a through-seal gap. PSEG determined that the through-seal gaps were approximately 3/16" in maximum width. In order to return the seals to the "as-designed condition", repairs were required to be performed prior to the removal of compensatory measures.

Corrective Action References: NOTFs 20868817, 20868818, 20869325, and 20869325

Performance Assessment:

Performance Deficiency: The team determined that PSEG's failure to adequately conduct inspections of fire penetration seals, as required by the Salem fire protection program, was a performance deficiency that was reasonably within PSEG's ability to foresee and prevent and should have been corrected. Specifically, PSEG failed to implement fire penetration seal inspection criteria required by SC.FP-SV.FBR-0026(Q), Flood and Fire Barrier Penetration Seal Inspection. As a result, unsatisfactory degradation was not identified on a Unit 1 and Unit 2 fire penetration seal during their last performed inspections in April 2013 and February 2018, respectively. Material shrinkage and separation on a wall of electrical penetration seals S1FBR-F-15403-048A and S2FBR-F-25403-072B was identified by the team on January 28, 2021, during a field walkdown.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Protection Against External Factors attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the degraded fire penetration seals could affect their availability, reliability, and capability to contain a contain fire within the single fire area experiencing the fire. In addition, this finding is more than minor because it was similar to Example 3.e of IMC 0612, Appendix E, "Examples of Minor Issues". The resulting condition was unacceptable, and the licensee had to perform maintenance to compensate for the degraded penetration seals.

Significance: The inspectors assessed the significance of the finding using Appendix F, "Fire Protection and Post - Fire Safe Shutdown SDP". This issue screened to very low safety significance (Green) in Phase 1, Task 1.4.4, Fire Confinement, because there were adequate automatic suppression systems in the fire areas on both sides of the fire penetration seals. In addition, PSEG completed a detailed evaluation that showed that the seals would remain functional during a fire. This is because the evaluation determined that the through-seal gaps would close-up and seal due to thermal expansion of the silicone elastomer seal material during a fire.

Cross-Cutting Aspect: H.1 - Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. PSEG did not ensure that personnel, equipment, procedures, and other resources were available and adequate to support nuclear safety. PSEG determined that additional

procedural enhancements and training were necessary to ensure that penetration seal degradation would be identified during future inspections.
Enforcement: Violation: Salem Unit 1FOL Condition 2.C.(5) and Salem Unit 2 FOL Condition 2.C.(10), in part, require PSEG to implement and maintain in effect all provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR) and as approved by the NRC. UFSAR Section 9.5.1.1.5, Quality Assurance Program for Fire Protection, states that the Quality Assurance Program at Salem assures that the requirements for design, procurement, installation, testing, and administrative controls for the fire protection program for safety related areas are satisfied and that instructions and procedures govern the fire protection program of inspections and tests. Procedure SC.FP-SV.FBR-0026(Q), Flood and Fire Barrier Penetration Seal Inspection, Revision 7, contained instructions and procedures governing the inspection of fire protection program fire barrier penetration seals. SC.FP-SV.FBR-0026(Q), Step 5.3.6 requires the performer to conduct a general inspection of each seal to verify operability by visually observing for the “as-designed condition” and that each fire barrier assembly exposed surface shall be visually inspected for degradation including signs of material shrinkage or separation from walls and components. Contrary to the above, PSEG inspections of Unit 1 fire penetration seal S1FBR-F-15403-048A in April 2013, and Unit 2 fire penetration seal S2FBR-F-25403-072B in February 2018, failed to adequately conduct SC.FP-SV.FBR-0026(C), Step 5.3.6. Each fire barrier assembly exposed surface was not adequately visually inspected for degradation including signs of material shrinkage or separation from walls and components. As a result, unsatisfactory degradation, such that the seals did not meet the “as-designed condition”, was not identified by PSEG. Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On February 12, 2021, the inspectors presented the triennial fire protection inspection results to Mr. Charles V. McFeaters, Senior Vice President of Nuclear Operations and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.21N.05	Calculations	S-C-FP-FEE-1746	Acceptable Operator Response Times to Appendix R Failures	4
		S-C-MS-MEE-1533	Loss of Main Steam Isolation Components due to an Appendix R Fire in FA-PP-92K or FA-PP-100H	2
		S-C-ZZ-EEE-1430	Loss of Offsite Power Evaluation for a Postulated Appendix R Fire at Salem Generating Station Units 1 & 2	2
	Corrective Action Documents	20856995 20857825 20839565 20857825 20785118 20807818 20841862 20803709 20785913 20785914 20785915 20785256		
	Corrective Action Documents Resulting from Inspection	20868795 20868817 20868818 20868820 20868896 20868911 20868913 20869240 20869043 20869055 20869119 20869122 20869325 20869326		

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		20869738 20869738 20869865 20869940		
	Engineering Changes	70186439-0040	GL 86-10 Evaluation for Acceptability of Operator Actions in the MCR	0
		80122088	Reroute 2CVAC39B-CT for Appendix R	10/4/2018
	Engineering Evaluations	Order 70198408-0070	Generic Letter 86-10 Evaluation for Penetrations within Fire Barrier Separating Fire Areas 12FA-SW-90A and 12FA-AB-90B	0
		Order 70216435-0010	Significant Degradation and Functionality Determination for Penetration Seals F-15403-048 and F-25403-072	2/9/2021
		S-C-FP-FEE-1725	Inaccessible Barriers and Penetration Seals	1
		S-C-FP-MSE-0824	10 CFR 50.59 Hope Creek Fire Suppression Water System as a Backup to Salem	0
		S2.ER-PS.FP-0001-A3-033	Salem Fire Protection Report - Safe Shutdown Analysis Volume 033	7/2/2020
		S2.ER-PS.FP-0001-A3-060	Salem Fire Protection Report - Safe Shutdown Analysis Volume 060	3/24/2020
		SC.ER-PS.FP-0001-A2	Salem Fire Protection Report Fire - Hazzard Analysis	12/2/2011
		SC.ER-PS.FP-0001-A3	Salem Fire Protection Report - Safe Shutdown Analysis	2/2/2018
		SC.ER-PS.FP-0001-A3	Salem Fire Protection Report – Safe Shutdown Manual Action Feasibility Assessment,	5/27/2020
		Technical Evaluation 70061473-0075	Evaluation of Salem Generating Station Post Fire Safe Shutdown Manual Action	1/6/2009
	Miscellaneous		Salem Nuclear Generating Station Safety Evaluation Report, Fire Protection Review, Unit 1	11/20/1979
		SC.ER-PS.FP-0001-A6	Salem Fire Protection Report - General	0
		SC.FP-SV.FBR-	Flood and Fire Barrier Penetration Seal Inspection	4/2013

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		0026(Q)		
		SC.FP-SV.FBR-0026(Q)	Flood and Fire Barrier Penetration Seal Inspection	2/2018
		VTD 311411	SF-60 with Cable Through Barrier Vendor Manual	0
	Procedures	CC-AA-211	Fire Protection Program	6
		FP-AA-005	Fire Protection Surveillance and Periodic Test Program	6
		FP-AA-011	Control of Transient Combustible Material	6
		FP-AA-015	Compensatory Measure Firewatch Program	9
		FP-SA-003	Actions for Inoperable Fire Protection-Salem Station	6
		MA-AA-734-469	Installation and Repair of Penetration Seals	1
		S1.OP-AB.CR-0002	Control Room Evacuation Due to Fire in the Control Room, Relay Room, 460V/230V Switchgear Room, or 4KV Switchgear Room	33
		S1.OP-AB.FIRE-0001	Control Room Fire Response	9
		S2.OP-AB.CR-0002	Control Room Evacuation Due to Fire in the Control Room, Relay Room, 460V/230V Switchgear Room, or 4KV Switchgear Room	33
		S2.OP-AB.FIRE-0001	Control Room Fire Response	9
		S2.OP-SO.CVC-0023	CVCS Cross-Connect Alignment to Unit 1	10
		SC.DE-PS.ZZ-0035	Salem Penetration Seal Program	0
		SC.DE-PS.ZZ-0035	Appendix 3, Criteria for Visual Field Inspections of Penetration Seals	0
	Work Orders	70214146 30343195		