



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
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August 10, 2022

Eric Carr
President and Chief Nuclear Officer
PSEG Nuclear, LLC – N09
P.O. Box 236
Hancocks Bridge, NJ 08038

**SUBJECT: HOPE CREEK GENERATING STATION – INTEGRATED INSPECTION
REPORT 05000354/2022002**

Dear Eric Carr:

On June 30, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Hope Creek Generating Station. On July 20, 2022, the NRC inspectors discussed the results of this inspection with Steve Poorman, Plant Manager, and other members of your staff. The results of this inspection are documented in the enclosed report.

Four findings of very low safety significance (Green) are documented in this report. Three of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations 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 Hope Creek Generating Station.

If you disagree with a cross-cutting aspect assignment 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 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 Hope Creek Nuclear Generating Station.

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,

Brice A. Bickett, Chief
Projects Branch 3
Division of Operating Reactor Safety

Docket No. 05000354
License No. NPF-57

Enclosure:
As stated

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SUBJECT: HOPE CREEK GENERATING STATION – INTEGRATED INSPECTION
REPORT 05000354/2022002 DATED AUGUST 10, 2022

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number: 05000354

License Number: NPF-57

Report Number: 05000354/2022002

Enterprise Identifier: I-2022-002-0034

Licensee: PSEG Nuclear, LLC

Facility: Hope Creek Generating Station

Location: Hancocks Bridge, NJ

Inspection Dates: April 1, 2022 to June 30, 2022

Inspectors: D. Beacon, Senior Resident Inspector
E. Garcia, Resident Inspector
J. Patel, Senior Resident Inspector
A. Turilin, Reactor Inspector
S. Veunephachan, Health Physicist
S. Wilson, Senior Health Physicist

Approved By: Brice A. Bickett, Chief
Projects Branch 3
Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Hope Creek Generating Station, 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 identify and correct degradation of the 'B' and 'C' station service water pump support pedestals			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000354/2022002-01 Open/Closed	[H.11] - Challenge the Unknown	71152
The NRC inspectors identified a Green finding and associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective action" when PSEG failed to promptly identify and correct two conditions adverse to quality. Specifically, the inspectors identified that the 'B' and 'C' station service water pump pedestals experienced spalling that resulted in the loss of an appreciable quantity of concrete material and called into question the ability of the pumps to perform their specified safety functions.			
Non-Code Repair of the Reactor Water Cleanup Line 1-BG-008			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000354/2022002-02 Open/Closed	[P.2] - Evaluation	71152A
The inspectors identified a Green finding because PSEG did not implement their procedure CC-AA-11 "Nonconforming Materials, Parts or Components," Revision 6, related to their acceptance of a non-conforming elbow in the reactor water cleanup (RWCU) system. Specifically, PSEG staff did not follow their procedure for dispositioning and accepting the non-code repair of an RWCU through-wall leak.			
Inadequate Preventive Maintenance for Safety-Related Inverter Circuit Cards			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000354/2022002-03 Open/Closed	[H.1] - Resources	71152A
A self-revealing Green finding and associated NCV of Technical Specification (TS) 6.8.1.a, "Procedures and Programs," was identified when PSEG did not adequately implement the safety-related (SR) inverter's circuit cards replacement frequency.			

Failure to adequately post-maintenance test the 'B' emergency diesel generator following fuel rack adjustment resulted in inoperability			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000354/2022002-04 Open/Closed	[H.5] - Work Management	71153
A self-revealing Green finding and associated NCV of Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings" was identified when PSEG failed to establish and implement an adequate post-maintenance test procedure following maintenance on the 'B' emergency diesel generator (EDG).			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
URI	05000354/2021013-02	URI - Evaluations associated with the impact on the intake structure of new hazards associated with barge traffic, ship traffic, and fuel oil spills	71111.17T	Closed
LER	05000354/2022-001-00	LER 2022-001-00 for Hope Creek Generating Station, B EDG Inoperable Resulting in a Condition Prohibited by Technical Specifications	71153	Closed

PLANT STATUS

The Hope Creek Generating Station (Hope Creek) began the inspection period at rated thermal power (RTP). On April 22, 2022, Hope Creek was down-powered to 74 percent RTP to perform turbine valve testing and remove the 'C' reactor feedwater pump from service for maintenance. The unit was returned to RTP on April 23, 2022. On April 24, 2022, Hope Creek was down-powered to 90 percent RTP for a control rod pattern exchange and returned to RTP on April 25, 2022. On June 9, 2022, Hope Creek commenced a shutdown for a maintenance outage to replace the pilot valves on 'H' and 'A' safety relief valves following indications of pilot valve leakage and replace 'A' and 'B' recirculation pumps seals. Following the maintenance outage, the unit returned to RTP on June 17, 2022. Hope Creek remained at or near RTP for the remainder of the inspection period.

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 performed activities described in IMC 2515, Appendix D, "Plant Status," observed risk significant activities, and completed on-site portions of IPs. 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.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Seasonal Extreme Weather (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated PSEG's readiness for seasonal extreme hot weather conditions on June 29, 2022

71111.04 - Equipment Alignment

Partial Walkdown (IP Section 03.01) (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) 'D' station service water system with chlorination out of service on May 5, 2022
- (2) 'A' and 'C' 4.16kV safety-related buses on May 26, 2022
- (3) High-pressure coolant injection system on June 7, 2022

Complete Walkdown (IP Section 03.02) (1 Sample)

- (1) 'A' residual heat removal system for shutdown cooling lineup on June 11, 2022

71111.05 - Fire Protection

Fire Area Walkdown and Inspection (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) Class 1E switchgear rooms in pre-fire plan FP-HC-3541 on April 6, 2022
- (2) 'A' and 'B' safety auxiliaries cooling system heat exchanger and pump rooms in pre-fire plans FP-HC-3432 and FP-HC-3433 on April 26, 2022
- (3) Service water intake structure in pre-fire plan FP-HC-3713 on June 21, 2022
- (4) Control building cable chases in pre-fire plan FP-HC-3551 on June 21, 2022
- (5) Control building electrical access area in pre-fire plan FP-HC-3543 on June 24, 2022

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

- (1) Service water intake structure on June 27, 2022

71111.11Q - Licensed Operator Regualification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

- (1) The inspectors observed and evaluated licensed operator performance in the main control room during a down-power for turbine valve testing and 'C' reactor feedwater pump maintenance on April 23, 2022

Licensed Operator Regualification Training/Examinations (IP Section 03.02) (1 Sample)

- (1) The inspectors observed and evaluated licensed operator performance in the simulator during an out-of-the-box training exercise on May 3, 2022

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (1 Sample)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

- (1) 'D' emergency diesel generator following exhaust leakage on April 26, 2022

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management (IP Section 03.01) (5 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Planned inoperability of the high-pressure coolant injection system during the week of April 4, 2022
- (2) Planned maintenance on 500kV 5015 Line and inoperability of 'F' filtration, ventilation, and recirculation system during week of April 13, 2022
- (3) Unavailability of 'C' reactor feedwater pump during steam leak repair on April 23, 2022
- (4) Planned inoperability of the 'A' emergency diesel generator on May 31, 2022
- (5) Protected equipment walkdown during shutdown cooling operations on June 11, 2022

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (4 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) 'B' safety and auxiliaries cooling system following unsatisfactory results during in-service testing on April 21, 2022
- (2) 'B' control room ventilation system following a trip and unplanned inoperability of the BK-400 chiller on April 28, 2022
- (3) Control blades 46-39 and 22-47 following indications of neutron absorber material leakage on May 3, 2022
- (4) 'D' service water pump for a non-functional traveling water screen on May 31, 2022

71111.17T - Evaluations of Changes, Tests, and Experiments

Sample Selection (IP Section 02.01) (1 Sample)

The inspectors reviewed the following evaluations, screenings, and/or applicability determinations for 10 CFR 50.59 from April 11, 2022 to April 21, 2022:

- (1) H2021-004 / S2021-003, Artificial Island Wind Port Facility, Revision 1

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) 'H' safety relief valve pilot valve temporary modification 4HT22-011 on May 24, 2022

71111.19 - Post-Maintenance Testing

Post-Maintenance Test (IP Section 03.01) (5 Samples)

The inspectors evaluated the following post-maintenance testing activities to verify system operability and/or functionality:

- (1) 'B' core spray suction relief valve replacement on April 11, 2022
- (2) 'F' filtration, recirculation, and ventilation system damper preventive maintenance on April 15, 2022
- (3) 'A' emergency core cooling system bailey trip logic following card and fuse failures on May 2, 2022
- (4) 'A' and 'H' safety relief valves pilot stage replacement on June 13, 2022
- (5) 'A' and 'B' reactor recirculation pumps seal package replacement on June 13, 2022

71111.20 - Refueling and Other Outage Activities

Refueling/Other Outage (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated maintenance outage activities from June 10, 2022 to June 15, 2022

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance testing activities to verify system operability and/or functionality:

Surveillance Tests (other) (IP Section 03.01) (2 Samples)

- (1) HC.OP-ST.KJ-0002, 'B' emergency diesel generator operability test on April 19, 2022
- (2) HC.MD-ST.PJ-0006, Preventive maintenance of 250 volt battery chargers using BCT-2000 with Alber windows software and associated surveillance testing on May 25, 2022

Inservice Testing (IP Section 03.01) (1 Sample)

- (1) HC.OP-IS.EA-0003, 'C' station service water pump in-service test on May 10, 2022

RADIATION SAFETY

71124.03 - In-Plant Airborne Radioactivity Control and Mitigation

Permanent Ventilation Systems (IP Section 03.01) (1 Sample)

The inspectors evaluated the configuration of the following permanently installed ventilation systems:

- (1) Main control room emergency filtration system

Temporary Ventilation Systems (IP Section 03.02) (1 Sample)

The inspectors evaluated the configuration of the following temporary ventilation systems:

- (1) Temporary high-efficiency particulate air vacuums

Use of Respiratory Protection Devices (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated the licensee's use of respiratory protection devices

Self-Contained Breathing Apparatus for Emergency Use (IP Section 03.04) (1 Sample)

- (1) The inspectors evaluated the licensee's use and maintenance of self-contained breathing apparatuses

71124.04 - Occupational Dose Assessment

Source Term Characterization (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated licensee performance as it pertains to radioactive source term characterization

External Dosimetry (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated how the licensee processes, stores, and uses external dosimetry

Internal Dosimetry (IP Section 03.03) (2 Samples)

The inspectors evaluated the following internal dose assessments:

- (1) Whole body count assessment on random individual who used respirator
- (2) Declared pregnant worker whole body count assessment

Special Dosimetric Situations (IP Section 03.04) (2 Samples)

The inspectors evaluated the following special dosimetric situations:

- (1) Declared pregnant worker
- (2) Neutron dosimetry

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS05: Safety System Functional Failures (IP Section 02.04) (1 Sample)

- (1) April 1, 2021 through March 31, 2022

MS06: Emergency AC Power Systems (IP Section 02.05) (1 Sample)

- (1) April 1, 2021 through March 31, 2022

BI01: Reactor Coolant System (RCS) Specific Activity Sample (IP Section 02.10) (1 Sample)

- (1) April 1, 2021 through March 31, 2022

BI02: RCS Leak Rate (IP Section 02.11) (1 Sample)

- (1) April 1, 2021 through March 31, 2022

71152A - Annual Follow-up Problem Identification and Resolution

Annual Follow-up of Selected Issues (Section 03.03) (3 Samples)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

- (1) 'B' emergency diesel generator inability to reach maximum required load during surveillance testing on May 9, 2022
- (2) Safety-related inverter (1DD481) output unintended transfer to backup AC source and the resultant unexpected safety and turbine auxiliaries cooling system response on May 19, 2022
- (3) Non-Code Repair of the Reactor Water Cleanup Line 1-BG-008 on June 28, 2022

71152S - Semiannual Trend Problem Identification and Resolution

Semiannual Trend Review (Section 03.02) (1 Sample)

- (1) The inspectors reviewed PSEG's corrective action program for trends that might be indicative of a more significant safety issue.

71153 – Follow-up of Events and Notices of Enforcement Discretion

Event Report (IP Section 03.02) (1 Sample)

The inspectors evaluated the following licensee event reports (LERs):

- (1) LER 05000354/2022-001-00, 'B' EDG Inoperable Resulting in a Condition Prohibited by Technical Specifications (ADAMS Accession No. ML22077A378). The inspection conclusions associated with this LER are documented in this report under Inspection Results Section 71153.

INSPECTION RESULTS

URI	URI - Evaluations associated with the impact on the intake structure of new hazards associated with barge traffic, ship traffic, and fuel oil spills. URI 05000354/2021013-02	71111.17T
<p><u>Description:</u> Unresolved item (URI) 05000354/2021013-02, 05000272/2021013-02, 05000311/2012013-02, "Evaluations associated with the impact on the intake structure of Wind Port Manufacturing Farm (WPMF) hazards associated with barge traffic, ship traffic, and fuel oil spills," was opened to determine if the evaluations associated with those hazards were bounded by the current licensing basis. The URI also tracked the inspectors' review of PSEG's planned revision to their 10 CFR 50.59 safety evaluation (SE) that reflected PSEG's decision to lease land directly to the State of New Jersey instead of a land sale.</p> <p>To address the outstanding questions in the URI, PSEG revised the 10 CFR 50.59 SE, H2021-004/S2021-003, Revision 1, and the associated hazards analysis. The inspectors noted that the SE reflected leasing of the land to the State of New Jersey and that PSEG retains the rights through the lease to access and to remove personnel and property for public safety, to take reasonable measures of security, to conduct emergency planning, entry to determine compliance with the lease, and limit critical chemicals and substances. The inspectors also noted that the SE is only applicable to potential hazards introduced to the Salem and Hope Creek plants resulting from the WPMF construction phase activities and is not applicable to potential hazards resulting from the WPMF operation phase.</p> <p>There was an outstanding question regarding construction phase shipping traffic becoming runaway vessels and potentially colliding with the Hope Creek Service Water Intake Structure (SWIS). To address this question, PSEG documented its conclusions in Attachment G of the revised Hazards Analysis Impact, 2020-04678. The construction phase will involve dredging an approach channel to the WPMF. PSEG collected data for dredging vessels, including ship displacement, draft, beam, and length to evaluate the kinetic energy that would be transferred to the SWIS if a vessel were to collide with it. Using an assumed transit velocity and assumed grounding distance, PSEG concluded that the maximum kinetic energy from a postulated construction vessel collision with the Hope Creek SWIS was bounded by the maximum kinetic energy assumed in the current licensing basis calculations. The inspectors researched the characteristics of potential dredging vessels, performed independent kinetic energy calculations, and reviewed the current licensing basis. The inspectors concluded the assumptions used in the kinetic energy calculations were reasonable and that the maximum energy applied to the Hope Creek SWIS from a postulated construction vessel collision was bounded by the Hope Creek current licensing basis. This result supported their responses in their SE to the criteria in 10CFR50.59 regarding this hazard.</p> <p>There was an outstanding question regarding construction phase WPMF related shipping traffic to potentially block the Hope Creek SWIS due to grounding or sinking directly in front of the structure. PSEG evaluated this potential hazard by assessing the construction vessel characteristics and how a blockage of the SWIS could impact the flow required to the service water pumps to ensure safe shutdown of the plant. PSEG concluded that due to certain design features of the SWIS, there would still be sufficient flow to the service water pumps regardless of the size and shape of the sunken vessel. The inspectors reviewed drawings of the SWIS and the basis for the flow requirement for the service water pumps. The inspectors concluded the potential hazard of the SWIS being blocked was bounded by the current licensing basis and that this result supported their responses in their SE to the criteria in 10CFR50.59 regarding this hazard.</p>		

There was an outstanding question regarding the impact to the Hope Creek SWIS from a postulated fire resulting from a fuel spill originating from a construction phase vessel. PSEG evaluated the fuel capacity of the construction phase vessels and determined that they would be limited to an amount significantly lower than the amount identified in the current licensing basis. PSEG also stated that the lease agreement with New Jersey has a fuel limitation identified for construction activities and that PSEG has the right to perform audits to ensure compliance with their lease restrictions. The inspectors reviewed the current licensing basis (CLB) for impacts to the SWIS from a fuel oil fire and determined the fuel capacity limitation on the construction phase vessels was bounded by the volume of fuel assumed in the calculations to support the CLB. This result supported their responses to the criteria in 10CFR 50.59 in their safety evaluation.

This URI is closed.

Corrective Action Reference: Not applicable.

Failure to identify and correct degradation of the 'B' and 'C' station service water pump support pedestals

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000354/2022002-01 Open/Closed	[H.11] - Challenge the Unknown	71152

The NRC inspectors identified a Green finding and associated NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective action" when PSEG failed to promptly identify and correct two conditions adverse to quality. Specifically, the inspectors identified that the 'B' and 'C' station service water pump pedestals experienced spalling that resulted in the loss of an appreciable quantity of concrete material and called into question the ability of the pumps to perform their specified safety functions.

Description: The station service water (SSW) system at Hope Creek consists of four motor driven pumps, and associated strainers, piping, valves, and monitoring instrumentation to provide cooling water from the Delaware River to safety-related plant components, including the safety and auxiliaries cooling system heat exchangers. The SSW system is safety-related and provides a seismic category 1, flood rated, emergency ultimate heat sink for cooling the reactor and spent fuel pool following postulated accident conditions, as well as during normal plant shutdown.

On February 17, 2022, during routine inspection activities, the NRC inspectors identified concrete spalling and missing concrete material on the concrete pedestal that supports the 'B' SSW pump, adjacent to the electrical conduit that penetrates the pedestal and houses the 4.16kV cabling that powers the SSW pump motor. Upon discovery, the inspectors observed the condition of the other three pumps and identified similar conditions on the 'C' SSW pump pedestal. The inspectors then notified Hope Creek operations personnel promptly. On February 22, 2022, the inspectors inquired regarding the status of the identified issue of concern. PSEG recognized that the issues had not yet been addressed and subsequently created notifications (NOTFs) 20897873 and 20897876 and screened them as conditions adverse to quality in Hope Creek's corrective action program (CAP).

The inspectors questioned whether these conditions had been identified in the past and whether corrective actions were planned or taken. In response, PSEG provided that NOTF 20636083 had been written in January 2014 to identify the condition of the 'C' SSW pump pedestal only. Additionally, NOTF 20671735 was written in December 2014 and documented further degradation of the 'C' SSW pump pedestal. However, the inspectors noted that these NOTFs were both screened as significance level 4, "N-CAP," and were not specifically included in PSEG's CAP. A work order was generated to address the N-CAP NOTF, but the work order due date was in 2028, no actions were taken, and the condition was not formally evaluated or monitored under PSEG processes. The inspectors reviewed the material condition reported when the issue was first identified by PSEG in 2014 (N-CAP), and the conditions observed during the February 17, 2022, inspection and noted that the condition appeared to have degraded further during that timeframe. Additionally, the technical evaluation associated with the 'C' SSW pump pedestal that was performed in response to this issue acknowledged that the condition had further degraded since 2014.

During the walkdown on February 17, 2022, the inspectors noted that spalled concrete material missing from the 'B' SSW pump pedestal was not located in the vicinity of the pedestal itself, implying that the material had been removed from the area at an earlier time by plant personnel. Additionally, the inspectors noted that the area of degradation was readily visible from a path of routine travel in the room. Work activities have been regularly performed in this area, including quarterly engineering walkdowns as required by PSEG procedure ER-AA-2030, "Conduct of Plant Engineering." Therefore, the inspectors concluded that the condition adverse to quality on the 'B' SSW pump should have been identified and evaluated in a timely manner. However, no prior NOTF was written for the condition observed on 'B' SSW, and therefore no evaluation or corrective action was performed.

PSEG procedure LS-AA-120, revision 23, "Issue Identification and Screening Process," step 3.2 directs all PSEG nuclear and supplemental personnel to identify conditions that have or could have an undesirable effect on performance of equipment, programs, or organizations. Additionally, section 4.2 of the procedure directs that a NOTF be written, without significant delay, after identification of such a condition. Therefore, the inspectors concluded that PSEG should have identified these conditions adverse to quality and entered them in their CAP prior to the NRC inspectors' discovery and subsequent engagement of PSEG personnel.

Corrective Actions: PSEG entered the conditions into their CAP under NOTFs 20897873 and 20897876. PSEG completed structural evaluations for each pump under order 70222204. Additionally, a site-wide communication was issued to reinforce the standards for entering conditions adverse to quality into the CAP in a timely manner.

Corrective Action References: 20897873, 20897876, 20902448, 20905075

Performance Assessment:

Performance Deficiency: The inspectors determined that PSEG's failure to identify and correct conditions adverse to quality on the 'B' and 'C' SSW pump pedestals in their CAP in accordance with the requirements of Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion XVI, "Corrective Action" and PSEG procedure LS-AA-120 was a performance deficiency within PSEG's ability to foresee and correct and should have been prevented.

Screening: The inspectors determined the performance deficiency was more than minor because if left uncorrected, it would have the potential to lead to a more significant safety concern. Specifically, evidence of ongoing degradation of the 'B' and 'C' SSW pump pedestals was identified, and further degradation could have impacted the SSW pumps' ability to withstand the effects of a seismic event and prevent the pumps from fulfilling their required safety function during an event. Additionally, the inspectors referenced IMC 0612, Appendix E, "Examples of Minor Issues" and determined that example 13.a. was similar and informed this more than minor determination. Specifically, for a significant period of time prior to NRC intervention, PSEG failed to identify and correct issues that could lead to equipment degradation and resultant failure.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding screened to Green, very low safety significance, because the finding includes a deficiency affecting the design or qualification of the SSW pumps and the pumps ultimately maintained their operability and probabilistic risk assessment (PRA) functionality.

Cross-Cutting Aspect: H.11 - Challenge the Unknown: Individuals stop when faced with uncertain conditions. Risks are evaluated and managed before proceeding. Specifically, the area of degraded concrete on the 'B' SSW pedestal was located in a direct travel path through the room, the spalled concrete material was removed from the immediate area, and quarterly engineering walkdowns were performed, which implied that PSEG personnel likely visually recognized the condition, but the potential safety impact of the condition was never challenged or formally identified in the CAP.

Enforcement:

Violation: Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion XVI, "Corrective Action" requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. PSEG's implementing procedure LS-AA-120, Revision 23, "Issue Identification and Screening Process," directs all PSEG nuclear and supplemental personnel to identify conditions that have or could have an undesirable effect on performance of equipment, programs, or organizations and document them using a NOTF in the corrective action program.

Contrary to the above, as of February 22, 2022, PSEG failed to promptly identify and correct two conditions adverse to quality when the 'B' and 'C' station service water pump pedestals experienced spalling that resulted in the loss of an appreciable quantity of concrete material and called into question the ability of the pumps to perform their specified safety functions.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Non-Code Repair of the Reactor Water Cleanup Line 1-BG-008			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000354/2022002-02 Open/Closed	[P.2] - Evaluation	71152A

The inspectors identified a Green finding because PSEG did not implement their procedure CC-AA-11 "Nonconforming Materials, Parts or Components," Revision 6, related to their acceptance of a non-conforming elbow in the reactor water cleanup (RWCU) system. Specifically, PSEG staff did not follow their procedure for dispositioning and accepting the non-code repair of an RWCU through-wall leak.

Description: On October 12, 2021, PSEG staff identified a through-wall leak in an elbow on a 4-inch RWCU line 1-BG-008, as documented in PSEG NOTF 20886336. The affected pipe segment is ASME Section III, Class 3 piping and classified as non-safety-related, seismically qualified (Qs), per Updated Final Safety Analysis Report Section 3.2 and Table 3.2-1. Operators isolated the RWCU system and PSEG staff repaired the leak with a weld buildup on the elbow per work order (WO) 60151273 on October 14, 2021. PSEG staff determined the leak occurred likely because of flow assisted corrosion at the elbow. Additionally, PSEG staff determined that, based on thickness measurements, the elbow was likely not the schedule intended by the plant configuration (schedule 40 vs 80).

The RWCU system provides a continuous purification of reactor water to maintain water clarity, reduces fouling of heat transfer surfaces, and minimizes secondary sources of radiation by minimizing activation of corrosion, wear, and fission products. The system takes suction from the recirculation loops and vessel bottom drain within the primary containment and after passing through various filters and demineralizers is discharged into the feedwater lines outside containment. A portion of the RWCU up to and including the outboard isolation valve (HV-F004) is classified as part of the reactor coolant pressure boundary (RCPB). The 4-inch elbow on RWCU line 1-BG-008 is downstream of HV-004 and is not part on the RCPB.

Following repair on the elbow, PSEG staff measured the wall thickness to confirm the elbow was repaired to the ASME Section III code minimum wall thickness requirements that would allow for plant operation until the next refueling outage during which the elbow would be replaced per order 70220603. Based on the measurement, PSEG staff determined that the repair did not meet code requirements. Specifically, the repaired elbow was below minimum wall thickness to confirm to the seismic calculation (Equation 9b) of ASME Section III. Due to reactor chemistry considerations and welding resources, PSEG staff determined that the through wall hole in pipe would be addressed with a non-code repair with the intent to restore pipe area integrity. PSEG staff performed a technical evaluation (80130086) to accept a minimum elbow wall thickness without accounting for seismic stresses and the system was restored to service with the through-wall leak repaired to a wall thickness that did not conform to seismic calculations.

On November 2, 2021, Engineering personnel initiated NOTF 20887922 to document that the station returned the RWCU system to service with a non-conforming code repair without accepting the non-conformance and recommended that the non-conformance be addressed per procedure CC-AA-11 "Nonconforming Materials, Parts, or Components." The notification recommended that a non-conformance evaluation be completed on this component as the minimum wall that the elbow was repaired to did not account for seismic stresses.

During their review of PSEG's notifications and actions, inspectors found that PSEG did not assign an action to perform a non-conformance evaluation to accept the identified non-conformance and allow the RWCU system to remain in service. The inspectors noted that this is contrary to CC-AA-11, step 4.2.3. PSEG documented this issue in NOTF 20899135*.

As a result of NRC observations, PSEG staff initiated a work group evaluation (WGE) per NOTF 20899135. The WGE determined that the direct cause for not performing the nonconformance evaluation was due to a lack of knowledge regarding the applicability of CC-AA-11 which led to a misunderstanding regarding the need for a non-conformance evaluation. In response, PSEG generated additional corrective actions. NOTF 20902421 was generated to re-evaluate notification 20887922 and assign an action to perform a non-conformance evaluation in accordance with CC-AA-11 as originally recommended.

Based on this, the inspectors determined that PSEG did not implement the requirements of procedure, CC-AA-11, for a nonconforming condition associated with the RWCU non-code repair. Specifically, PSEG did not follow their procedure to verify that the thinned pipe elbow would not introduce a location different for pipe breaks than assumed in FSAR section 3.6.2 and Table 3.6-11 and affect safe shutdown equipment.

Corrective Actions: PSEG's corrective actions included documenting the above concerns in their corrective action program, re-performing a review of NOTF 20887922 to conduct a non-conformance evaluation, and completing a finite element analysis to demonstrate that design basis stress equations and pipe break criteria on the RWCU non-code through-wall leak repair are satisfied until the planned replacement date.

Corrective Action References: 20886336, 20886112, 20886549, 20886880, 20887179, 20887922, 20899135*, 20902421*, 20902187*

Performance Assessment:

Performance Deficiency: PSEG did not follow their CC-AA-11 procedure for a non-conforming through-wall leak repair in the RWCU system prior to placing the system back in service. This was a performance deficiency that should have been foreseen and corrected and should have been prevented.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Design Control attribute of the initiating events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, placing the RWCU system back in service with a pipe wall thickness below the allowable code minimum allowable value without evaluating its effects, caused reasonable doubt on the ability of pipe to remain intact during a seismic event to ensure that nearby safety-related SSC would not be affected by the potential high energy line break before the RWCU system was isolated.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 1, "Initiating Events Screening Questions," inspectors determined this finding was of very low safety significance (Green) because, based on the finite element analysis, the repaired elbow would have remained intact during a seismic event and, therefore, did not result in exceeding the RCS leak rate for a small loss of cooling accident (LOCA) nor have likely affected other systems used to mitigate a LOCA.

Cross-Cutting Aspect: P.2 - Evaluation: The organization thoroughly evaluates issues to ensure that resolutions address causes and extent of conditions commensurate with their

safety significance. Specifically, PSEG did not evaluate their acceptance of the RWCU non-code repair in accordance with their non-conformance process per CC-AA-11.

Enforcement: Inspectors did not identify a violation of regulatory requirements associated with this finding.

Inadequate Preventive Maintenance for Safety-Related Inverter Circuit Cards

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green NCV 05000354/2022002-03 Open/Closed	[H.1] - Resources	71152A

A self-revealing Green finding and associated NCV of Technical Specification (TS) 6.8.1.a, "Procedures and Programs," was identified when PSEG did not adequately implement the safety-related (SR) inverter's circuit cards replacement frequency.

Description: On January 12, 2022, PSEG operators in the main control room received abnormal alarms and indications of a failure with the normal power supply to the SR 1DD481 inverter. The inverter's output automatically transferred, as designed, to the backup alternating current (AC) power to continue supplying power to its associated SR 120V AC loads. After the transfer, a voltage perturbation on the SR 120V AC instrument panel (1D-J-481) caused an incomplete swap of turbine auxiliaries cooling system (TACS) from the 'B' safety auxiliaries cooling system (SACS) to the 'A' SACS. The TACS swap transient caused EGPSV-6220B, the SACS relief valve downstream of the 'B' residual heat removal (RHR) heat exchanger, to open relieving SACS water into the 'B' RHR pump room. This event rendered the 1DD481 inverter inoperable and caused entry into a 7-day shutdown technical specification action statement (TSAS) 3.8.3.1.a.4. Lifting of the SACS relief valve rendered the 'B' RHR system inoperable and caused entry into 7-day shutdown TSAS 3.6.2.2 and 3.6.2.3 for 'B' RHR suppression pool spray and suppression pool cooling functions. Additionally, PSEG manually secured the 'B' SACS pump to allow the relief valve to reseal, which resulted in an unplanned entry into a 30-day shutdown TSAS TS 3.7.1.1.

During initial inspection and troubleshooting, PSEG found two blown fuses, the main DC power fuse (F101) and the static switch fuse (F151), in the inverter circuit. PSEG determined that the cause of blown fuses and the voltage perturbation was circuit card failure. Specifically, during troubleshooting activities, PSEG replaced two circuit cards (current rate boost card and regulator control logic card) to restore the inverter to operable status.

PSEG completed an equipment reliability evaluation (ERE) 70221545 to evaluate the 1DD481 inverter failure. This evaluation determined, in part, that the circuit cards failed because of age as the 1DD481 inverter is initial plant equipment. The circuit cards have been in service since their original construction. The ERE discussed that the inverters had a preventive maintenance (PM) strategy to replace their circuit cards every 18 years. Furthermore, the ERE recognized that the initial replacement frequency of 9 years was based on a performance-centered maintenance (PCM) template. However, in 2008, PSEG performed a PCM template evaluation to change it to 18 years. Despite having an 18-year PM established to replace the cards, PSEG first deferred and then revised its scope before implementation.

The inspectors reviewed the 1DD481 inverter ERE and the inverter's PM strategy and noted that PSEG had assigned a corrective action from an apparent cause evaluation (70162737) performed for a 1DD481 inverter failure event in December 2013. That action was to replace 1DD481 inverter circuit cards by implementing the 18-year PM plan. However, the 18-year PM was deferred from its original due date in 2015 to 2021 to align with a scheduled inverter replacement during refueling outage RFO23. During RFO23 in 2021, the replacement inverter was unavailable due to external factors with Cyberex, the inverter manufacturer. PSEG developed a bridging strategy that revised the PM plan with preventive maintenance change request (PCR) 80127440, which modified the PM plan to replace only the sense and transfer circuit card until inverter replacement in 2027. The inverter's current rate boost and regulator control logic cards were not replaced and remained in service.

The ERE determined that the PCR 80127440 strategy to replace only a sense and transfer circuit card was not evaluated by the plant health committee. The ERE determined that the maintenance/bridging plan implemented in 2021 to maintain inverter functionality until 2027 was shown by this failure as insufficient. The inspectors reviewed PSEG's procedure ER-AA-210, "Preventive Maintenance Program," Revision 3, which utilizes PCM templates to develop preventive maintenance plans. The inspectors determined that PSEG's PCR 80127440 that deferred and modified the preventive maintenance plan did not adequately evaluate the risk associated with the current rate boost and regulator control logic cards and potentially plant impact due to its failure. Therefore, the inspectors concluded that PSEG did not adequately implement and appropriately revise the PM strategy associated with replacing the current rate boost and regulator control logic circuit cards for the 1DD481 inverter. The inspectors concluded that this event would have been prevented if those aging circuit cards had been replaced as per the original PM plan.

Corrective Actions: PSEG's immediate corrective actions were to replace the failed circuit cards. PSEG performed an ERE (70221545), determined the cause of the failure, and initiated a broader review of their equipment reliability strategy for all safety-related inverters to present results to the plant health committee.

Corrective Action References: 20894822, 20895389, 20896744

Performance Assessment:

Performance Deficiency: PSEG failing to adequately implement the replacement frequency for the 1DD481 inverter circuit cards in accordance with their preventive maintenance program implementing procedure ER-AA-210, Revision 3, and was a performance deficiency that was within PSEG's ability to foresee and correct that should have been prevented.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the initiating events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure of the circuit cards challenged plant stability and rendered multiple safety-related systems inoperable for a short duration.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using Exhibit 1, "Initiating Events Screening Questions," the finding screened to Green, very low safety significance, because for findings involving support system initiators, i.e., the loss of a

DC bus, the result did not involve a complete or partial loss of a support system, and it did not increase the likelihood of a complete loss of a support system that would result in a plant trip.

Cross-Cutting Aspect: H.1 - Resources: Leaders ensure that personnel, equipment, procedures, and other resources are available and adequate to support nuclear safety. Specifically, PSEG did not ensure the replacement inverter was available in 2021. Furthermore, when PSEG could not replace the inverter, they did not ensure the replacement circuit cards were available to maintain the reliability of the inverter.

Enforcement:

Violation: TS 6.8.1.a, "Procedures and Programs," requires in part, that written procedures recommended in Appendix A of Regulatory Guide (RG) 1.33, Revision 2, shall be established, implemented, and maintained. Section 9.b of RG 1.33, Revision 2, Appendix A, requires that PM schedules should be developed to specify the inspection or replacement of parts that have a specific lifetime. PSEG procedure ER-AA-210, "Preventive Maintenance (PM) Program," Revision 3, details the implementation of maintenance strategies utilizing the PCM templates.

Contrary to the above, PSEG failed to implement and appropriately revise the maintenance strategies associated with replacing circuit cards for the SR channel 'D' (1DD481) inverter. Specifically, in April 2021, PSEG failed to adequately implement an 18-year PM plan to replace the current rate boost and control logic circuit cards in the 1DD481 inverter. As a result, an age-related failure of circuit cards for the SR 1DD481 inverter occurred on January 12, 2022, which caused voltage perturbations on the 120V AC instrument panel resulting in incomplete TACS isolation and impacting the 'B' SACS loop when the SACS relief valve was lifted. This failure rendered 1DD481 inoperable and caused entry into multiple 7-day shutdown action statements.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Observation: Non-Code Repair of the Reactor Water Cleanup Line 1-BG-008	71152A
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The inspectors reviewed PSEG corrective actions taken related to the October 12, 2021, RWCU system pipe elbow leak repair. The issues were documented in PSEG's corrective action program as NOTFs 20886336, 20886112, 20886549, 20886880, 20887179, 20887922, 20899135, 20902421 and 20902187. The inspectors reviewed the corrective actions taken and planned, cause analysis, extent of condition and past functionality evaluations.

The inspectors assessed PSEG's evaluation of the issue, and corrective actions for adequacy and timeliness. The inspectors noted that long term corrective actions are still in progress and PSEG implemented plans to replace the pipe elbow in the next refueling outage.

The inspectors identified one Green finding associated with the non-conforming RWCU leak repair as documented in this report.

Observation: Annual Follow-up – Safety-Related 1DD481 Inverter Output Unintended Transfer to Backup Source and the Resultant SACS System Response	71152A
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The inspectors reviewed PSEG's corrective actions associated with the safety-related inverter (1DD481) output experiencing an unintended transfer to its backup AC source and the resultant overpressure transient causing the SACS relief valve PSV-6220B to open. PSEG performed an ERE 70221545 to determine the cause of inverter failure and ERE 70221517 to determine the cause of SACS system response. The issues and corrective actions planned were documented in PSEG's CAP as notifications (NOTFs) 20894822, 20895389, 20894929, 20894930, 20894931, 20896744, 20894928, 20895538, 20894956, 20896750, 20899535, and 20902163.

Related to the SACS relief valve lifting event, PSEG determined that while the relief valve lifted as designed, it did not automatically reseal because the maximum operating pressures were likely higher than the specified reseal pressure. PSEG determined the direct cause to be inappropriate relief valve specifications that designated the relief valve's resealing pressure or blowdown setting close to the maximum SACS operating pressure. The relief valve design function is to protect the RHR heat exchanger and SACS piping from a tube failure in the RHR heat exchanger. The inspectors noted that the maximum pressure the SACS piping is analyzed for is below the lift setpoint of the relief valve (i.e., 150 psig vs. 180 psig). PSEG concluded that the relief valve lift setpoint is accurate based on the review of design calculation EG-0006, "RHR SACS Safety Relief Valve," Revision 0.

As concerned in ERE 70221517, Hope Creek's piping line index drawing P-0501, Revision 39, shows that line number 1-EG-158, SACS piping downstream of the RHR heat exchanger to SACS relief valve PSV-6220B, is evaluated for a maximum pressure of 150 psig. Hope Creek's design analysis C-0947, a design bases stress calculation for the SACS system, analyzed SACS piping for a maximum pressure of 150 psig. Based on this discrepancy, the inspectors questioned whether the SACS piping was adequate to withstand a maximum pressure of 180 psig when this specific SACS piping was evaluated for a maximum pressure of 150 psig.

In response to inspectors' questions, PSEG performed a technical evaluation (TE) to determine the impact of a maximum pressure change from 150 psig to 180 psig for the adequacy of the SACS piping capacity. TE 80132131 (DEC220057) evaluated and concluded that the change in maximum pressure is acceptable, and the ASME B&PV Code, Section III, Subsection ND-3640, Equation 9 stress margin remains above 17 percent using the conservative methodology. ASME equations 8, 10, and 11 have no impact due to the change in maximum pressure. Additionally, PSEG assigned a corrective action (CRCA 70221517-0120) to revise the stress calculation C-0947 to change the maximum pressure from 150 psig to 180 psig and update the results to reflect it on the piping line index drawing P-0501.

The inspectors determined that PSEG not analyzing the SACS piping for a maximum pressure of 180 psig was a minor performance deficiency in accordance with the requirements of 10 CFR 50, Appendix B, Criterion III, "Design Control." Using the NRC IMC 0612, Appendix B, "Issue Screening Directions," the performance deficiency was determined to be minor because, as demonstrated by TE 80132131 and pipe stress analysis, the current piping is adequate to withstand an increase in maximum pressure from 150 psig to 180 psig. Additionally, sufficient margin remains in the ASME stress equations impacted by the change in maximum pressure. PSEG has entered this issue into their corrective action program and planned corrective action to address it (70221517-0120). This failure to comply with 10 CFR 50, Appendix B, Criterion III constitutes a minor violation that is not subject to enforcement action consistent with Section 2.3.1 of the NRC's enforcement policy.

Observation: Semi-annual trend observation	71152S
<p>The inspectors performed a semi-annual review of site issues to identify trends that might indicate the existence of more significant safety concerns. As part of this review, the inspectors included repetitive or closely related issues documented by PSEG in their CAP database, trend reports, major equipment problem list, system health reports, and maintenance or CAP backlog. The inspectors determined, in general, PSEG was appropriately identifying, evaluating, and resolving issues and potential trends. The inspectors recognized one general trend related to potential decline in the quality of PSEG's control of various work activities, instructions, and procedures. Examples of issues that inform this trend include:</p> <ul style="list-style-type: none"> • The 'B' EDG was improperly post-maintenance tested, resulting in inoperability (Green NCV in this report, NOTF 20891842) • NRC inspectors identified a 250 VDC battery charger surveillance test procedure that, as written, suggested performance of preconditioning (NOTF 20902772 and 20906923) • Reactor water cleanup isolated due to inadequate work instructions that led to an unexpected valve closure (NOTF 20906674 and 20906675) • 'C' station service water pump packing leak-off rate was not confirmed to be within the preferable range, as required by procedure (Work Order 60152654) <p>PSEG evaluated each of these examples individually and entered the appropriate corrective action processes to address each. The inspectors reviewed PSEGs planned and completed corrective actions, as applicable, and did not identify any performance deficiencies of more than minor significance during this review.</p>	

Failure to adequately post-maintenance test the 'B' emergency diesel generator following fuel rack adjustment resulted in inoperability			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000354/2022002-04 Open/Closed	[H.5] - Work Management	71153
A self-revealing Green finding and associated NCV of Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings" was identified when PSEG failed to establish and implement an adequate post-maintenance test procedure following maintenance on the 'B' emergency diesel generator (EDG).			
<p><u>Description:</u> The Hope Creek class 1E alternating current power system includes four EDGs which serve as standby power supplies for the four safety-related 4.16kV buses in the event of loss of both the normal and alternate power sources (LOP) to the respective buses. Each EDG is designed to automatically start following a LOP and provide power to its respective emergency bus and safety-related loads that sequentially load onto the bus. The load capacity of each EDG is designed to support the timely sequential loading of safety-related equipment designed to mitigate postulated design basis accidents, including loss of coolant accidents. Each EDG is designed to provide 4430kW continuously, and to provide for excess loads between 105 percent (4652 kW) and 110 percent (4873 kW) of the EDG's continuous load rating for at least two hours.</p>			

The Hope Creek TS limiting condition for operation 3.8.1.1 requires each of the four EDGs to be operable while the facility is in operational conditions 1, 2, or 3. Additionally, surveillance requirement (SR) 4.8.1.1.2.K.1 requires, in part, that each EDG be demonstrated operable by verifying that the EDG operates for at least 24 hours, loaded between 4000 and 4400 kW for the first 22 hours and loaded between 4652 and 4873 kW for the remaining 2 hours.

On January 19, 2022, during a surveillance test to demonstrate SR 4.8.1.1.2.K.1, after approximately 22 hours of running at loads between 4000 and 4400 kW, PSEG discovered that the 'B' EDG was unable to achieve greater than 4650 kW and was therefore unable to fulfill the final 2-hour portion of the SR. The 'B' EDG was declared inoperable on this basis and PSEG entered the condition into their corrective action program (CAP) under notification (NOTF) 20891842. Subsequent investigation by PSEG personnel revealed that the EDG's fuel rack and injector system was unable to provide enough fuel to meet the required load demand. The fuel rack was adjusted to increase fueling, and the surveillance test was successfully completed on January 23, 2022.

PSEG performed a WGE, a type of CAP causal evaluation, under order 70221547, to investigate the cause of this issue. It was discovered that the 'B' EDG fuel rack was adjusted on May 2, 2021, to better balance cylinder performance across the machine based on individual cylinder parameters that were observed during a break-in run. However, following the fuel rack adjustment, the post-maintenance test (PMT) of the 'B' EDG's capability was not adequately planned and implemented. Specifically, the PMT that was performed did not load the EDG between 4652 and 4873 kW, and therefore did not demonstrate the full EDG capability.

PSEG procedure MA-AA-716-012, "Post-Maintenance Testing," step 4.1.3.4, specified that tests be conducted under the appropriate system operating parameters. Step 4.2.16 specified that if a maintenance activity rendered an SSC inoperable, the affected SSC shall not be declared operable until applicable testing requirements have been satisfied. Additionally, MA-AA-716-012 Attachment 2 provided direction for the applicable PMT requirements based on the maintenance activity performed. Specifically, for maintenance on fuel systems, the attachment listed "TS 4.8.1.1.2" as the appropriate requirement to be met. The inspectors noted that multiple TS SRs fall under TS 4.8.1.1.2, and as a result, the procedure left the appropriate PMT requirement open to interpretation. As a result, on May 3, 2021, PSEG did not adequately PMT the 'B' EDG before declaring operability. Specifically, the PMT that was performed did not attempt to run the EDG between loads of 4652-4873 kW and, therefore, the EDG's inability to achieve this load remained unknown for 266 days.

The inspectors reviewed PSEG design calculation E-9, which conservatively details the worst-caseload that could be expected of the most limiting EDG at Hope Creek during postulated design basis accident conditions. The inspectors noted that the conservative worst-caseload was 4628.44 kW, and the 'B' EDG demonstrated its ability to achieve 4650 kW during the failed surveillance test on January 19, 2022. Therefore, the inspectors concluded that, while the EDG was inoperable due to its inability to fulfill SR 4.8.1.1.2.K.1, the EDG was able to fulfill its PRA credited functions throughout the period of inoperability.

As a result of this issue, PSEG submitted LER 05000354/2022-001-00 in accordance with 10 CFR 50.73(a)(2)(i)(B), as required for the condition prohibited by TS. This NCV serves as closure documentation for LER 05000354/2022-001-00.

Corrective Actions: PSEG entered the condition into their CAP under NOTF 20891842, adjusted the fuel rack position, and successfully demonstrated the 'B' EDG's capability to meet SR 4.8.1.1.2.K.1. PSEG performed a WGE (70221547) and determined the cause of the failure. PSEG procedure MA-AA-716-012, "Post-Maintenance Testing," was revised to include specificity to test EDGs to 105 percent-110 percent load following fuel rack adjustments. Additionally, maintenance procedure HC.MD-CM.KJ-0009 was revised to include more strict controls over fuel rack adjustment activities.

Corrective Action References: 20891842, 70221547

Performance Assessment:

Performance Deficiency: On May 3, 2021, PSEG declared the 'B' EDG operable without adequately testing it under appropriate system operating parameters to demonstrate operability in accordance with PSEG procedure MA-AA-716-012. Specifically, the PMT performed did not attempt to load the 'B' EDG between 4652 kW and 4873 kW and the EDG was declared operable despite its inability to achieve this required load. PSEG's failure to adequately PMT the 'B' EDG was a performance deficiency that was within PSEG's ability to foresee and correct and should have been prevented.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance 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 inadequately positioned fuel rack was not detected prior to returning the 'B' EDG to service because the PMT performed on May 3, 2021, was inadequate. The condition impacted the EDG's maximum achievable load and caused the EDG to fail TS surveillance requirement 4.8.1.1.2.K.1 on January 19, 2022. This demonstrated that reasonable assurance of the 'B' EDG's capability to respond to initiating events to prevent undesirable consequences was not established between May 3, 2021, and January 19, 2022, and the cornerstone objective was therefore impacted. The inspectors referenced NRC IMC 0612, Appendix E, "Examples of Minor Issues," examples 1.a and 2.a. to inform this more than minor determination.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." The finding screened to Green, very low safety significance, because the finding includes a deficiency affecting the design or qualification of the 'B' EDG and it maintained its PRA functionality. Specifically, despite the inadequate fuel rack position, the EDG was demonstrated to be able to achieve and maintain enough load to fulfill its PRA functions.

Cross-Cutting Aspect: H.5 - Work Management: The organization implements a process of planning, controlling, and executing work activities such that nuclear safety is the overriding priority. The work process includes the identification and management of risk commensurate to the work and the need for coordination with different groups or job activities. Specifically, PSEG's work management process did not appropriately plan or control the scope of the post-maintenance test that was performed, which prevented the misadjusted fuel rack from being identified prior to returning the 'B' EDG to service.

Enforcement:

Violation: Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, and shall be accomplished in accordance with these instructions, procedures, or drawings. PSEG's procedure MA-AA-716-012, "Post-Maintenance Testing," Revision 22, implemented this requirement to ensure that SSCs perform their intended function when returned to service post maintenance. Additionally, the Hope Creek TS, limiting condition for operation 3.8.1.1, requires that four EDGs be operable and that when the 'B' EDG is inoperable, action b.2 requires the EDG to be restored to operable status within 72 hours, or 14 days with verification of an available supplemental power source. Otherwise, Hope Creek shall be placed in "hot shutdown" mode within 12 hours and "cold shutdown" within the following 24 hours.

Contrary to the above, on May 3, 2021, PSEG failed to adequately post-maintenance test the 'B' EDG, an activity affecting quality, because procedure MA-AA-716-012 failed to adequately prescribe the appropriate post-maintenance test activity. As a result, the 'B' EDG was inoperable from May 3, 2021, until January 23, 2022, a period of 266 days, and PSEG operated Hope Creek in the "startup" or "power operation" modes for the majority of this time period, excluding unrelated shutdown activities that occurred between May 3 to 14, 2021, May 24 to 29, 2021, June 27 to 29, 2021, and July 21 to 25, 2021.

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 April 21, 2022, the inspectors presented the Artificial Island Wind Port Facility Safety Evaluation, IP 71111.17T inspection results to Robert W. DeNight, Vice President, Nuclear Corporate Operations Support, and other members of the licensee staff.
- On June 8, 2022, the inspectors presented the IP 71124.03 & 71124.04 inspection results to Michael Moore, Acting Plant Manager, and other members of the licensee staff.
- On July 6, 2022, the inspectors presented the HC RWCU annual problem identification and resolution sample inspection results to Steve Poorman, Hope Creek Plant Manager, and other members of the licensee staff.
- On July 20, 2022, the inspectors presented the integrated inspection results to Steve Poorman, Hope Creek Plant Manager, and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.17T	Miscellaneous	2020-04678	PSEG Power Hazards Analysis Impact	Revision 1
71111.20	Corrective Action Documents	20906357	13AF23 failed reserve flow IST	05/16/2022
	Procedures	SC.RE-FR.ZZ-0019	Refueling	Revision 34
71152A	Corrective Action Documents	20886112		
		20886336		
		20886549		
		20886880		
		20887179		
		20887922		
	Corrective Action Documents Resulting from Inspection	20899135		
		20902187		
		20902421		
	Engineering Changes	Temporary Configuration Change Package (TCCP) 4FT22-005	Non-Conforming Elbow on RWCU Line 1-BG-008	Revision 0
	Miscellaneous	H2022-043	4HTT22-005 (80130578) 50.59 Screening	05/25/2022
	Procedures	CC-AA-11	Nonconforming Materials, Parts, or Components	Revision 6
	Work Orders	60151076		
		60151273		