



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

January 28, 2019

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

SUBJECT: HOPE CREEK GENERATING STATION UNIT 1 – INTEGRATED INSPECTION
REPORT 05000354/2018004

Dear Mr. Sena:

On December 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Hope Creek Generating Station (HCGS). On January 16, 2019, the NRC inspectors discussed the results of this inspection with Mr. Eric Carr, Site Vice President and other members of your staff. The results of this inspection are documented in the enclosed report.

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

If you contest the violations or the significance of these NCVs, 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 HCGS. In addition, 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 HCGS.

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 the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

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

Docket No. 50-354

License No. NPF-57

Enclosure:
Inspection Report 05000354/2018004

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REPORT 05000354/2018004 DATED JANUARY 28, 2019

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number: 50-354

License Number: NPF-57

Report Number: 05000354/2018004

Enterprise Identifier: I-2018-004-0010

Licensee: PSEG Nuclear LLC (PSEG)

Facility: Hope Creek Generating Station (HCGS)

Location: Hancocks Bridge, NJ 08038

Inspection Dates: October 1, 2018 to December 31, 2018

Inspectors: J. Hawkins, Senior Resident Inspector
S. Haney, Resident Inspector
J. Brand, Senior Reactor Inspector
J. DeBoer, Emergency Preparedness Inspector
J. Furia, Senior Health Physicist
T. Fish, Senior Operations Engineer

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

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring PSEG's performance at Hope Creek Generating Station (HCGS) Unit 1 by conducting the baseline inspections described in this report 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. NRC identified and self-revealed findings, violations, and additional items are summarized in the table below. Licensee-identified non-cited violations (NCVs) are documented in the following Inspection Results sections of the report: 71152.

List of Findings and Violations

Inadequate High Pressure Coolant Injection Trip Unit Preventive Maintenance			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Reactor Safety – Mitigating Systems	Green NCV 05000354/2018004-01 Closed	P.2 – Problem Identification and Resolution – Evaluation	71153
A Green self-revealing non-cited violation (NCV) of Technical Specification (TS) 6.8.1.a, "Procedures and Programs," was identified because PSEG did not adequately establish, implement, and maintain the initial replacement frequency for the Rosemount trip units, which are circuit cards used in various emergency core cooling systems (ECCS) at HCGS. As a result, on September 26, 2018, a failure of the high pressure coolant injection (HPCI) system high water level trip unit occurred resulting in a blown fuse affecting the operability of HPCI and other 'A' channel ECCS (Residual Heat Removal (RHR) and Core Spray). This resulted in PSEG entering a 12 hour shutdown Technical Specification Action Statement (TSAS) (TS 3.5.1.c.2), an 8 hour non-emergency report (EN#53625) for the HPCI system being inoperable, and a licensee event report (LER) for a condition that could have prevented the fulfillment of a safety function.			

Additional Tracking Items

Type	Issue number	Title	Inspection Results Section	Status
LER	05000354/2018-004-00	High Pressure Coolant Injection System Inoperable due to Failed Fuse	71153	Closed

PLANT STATUS

Hope Creek Generating Station (HCGS) began the inspection period at 100 percent rated thermal power (RTP). On December 6, 2018, Hope Creek reduced power to approximately 69 percent rated thermal power to support planned main turbine valve testing, control rod scram time and settle testing, control rod sequence exchange, and plant repairs, and returned to full power on December 8, 2018. There were no other operational power changes of regulatory significance 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 plant status activities described in IMC 2515, Appendix D, "Plant Status" and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess PSEG performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Seasonal Extreme Weather (1 Sample)

The inspectors evaluated readiness for seasonal extreme weather conditions prior to seasonal cold temperatures the week of November 26, 2018

71111.04 - Equipment Alignment

Partial Walkdown (4 Samples)

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

- (1) 'C' Emergency Diesel Generator (EDG) after the rocker arm lube oil tank was found with elevated moisture levels during the week of October 22, 2018
- (2) 'A' Primary Containment Instrument Gas (PCIG) system compressor after unsuccessful capacity test and troubleshooting the week of October 22, 2018
- (3) 'B' and 'C' Station Service Water (SSW) with the 'A' SSW pump out of service for planned maintenance on October 29, 2018
- (4) Reactor protection system (RPS) relay missing sealant extent of condition inspections on December 12, 2018

71111.05AQ - Fire Protection Annual/Quarterly

Quarterly Inspection (5 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

- (1) 'C' EDG room during the week of October 22, 2018
- (2) 'B' Variable Frequency Drive pump room during the week of October 29, 2018
- (3) Auxiliary building Heating, Ventilation and Air Conditioning (HVAC), inverters and battery rooms during the week of November 1, 2018

(4) Auxiliary and service radwaste building cable tray and battery rooms during the week of November 15, 2018

(5) Auxiliary building switchgear rooms during the week of December 5, 2018

71111.06 - Flood Protection Measures

Internal Flooding (1 Sample)

The inspectors evaluated internal flooding mitigation protections in reactor auxiliaries cooling system room on November 8 and 9, 2018.

71111.11 - Licensed Operator Regualification Program and Licensed Operator Performance

Operator Regualification (1 Sample)

The inspectors observed and evaluated a crew of licensed operators in the plant's simulator during licensed operator annual regualification operating examination that involved a reactor water cleanup pump trip, loss of the 10D410 125 volts direct current bus, high main turbine vibrations, a loss of offsite power and loss of coolant accident, and reactor vessel flooding on November 20, 2018.

Operator Performance (1 Sample)

The inspectors observed and evaluated a planned down power to 69 percent rated thermal power to support planned main turbine valve testing, control rod scram time and settle testing, control rod sequence exchange, and plant repairs on December 6, 2018.

Operator Regualification Exam Results (Annual) (1 Sample)

The inspectors reviewed and evaluated regualification examination results (written and operating test) on December 21, 2018.

Operator Regualification Program and Operator Performance (Biennial) (1 Sample)

The inspectors reviewed and evaluated operator performance, evaluator performance, and simulator performance during the regualification examinations completed on December 19, 2018.

71111.12 - Maintenance Effectiveness

Routine Maintenance Effectiveness (2 Samples)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

(1) High Pressure Coolant Injection (HPCI) trip unit failure on September 26, 2018

(2) Reactor Manual Control System transformer and power supplies failures during the week of November 6, 2018

71111.13 - Maintenance Risk Assessments and Emergent Work Control (4 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

- (1) Unplanned 'A' Electro-Hydraulic Control (EHC) pump replacement on October 15, 2018
- (2) Planned open phase group 'B' alarm and trip testing on November 28, 2018
- (3) Planned 'A' Standby Liquid Control (SLC) pump testing on November 29, 2018
- (4) Planned single source of offsite power line-up during open phase testing and switchyard expansion from December 7 through 9, 2018

71111.15 - Operability Determinations and Functionality Assessments (3 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) 'D' RHR minimum flow check valve chattering while performing the quarterly surveillance test on October 24, 2018
- (2) 'B' SSW pump discharge vent valve configuration control on November 12, 2018
- (3) 'B' and 'D' EDG and HPCI transfer/isolation switch testing during the week of December 12, 2018

71111.18 - Plant Modifications (2 Samples)

The inspectors evaluated the following temporary modifications:

- (1) Temporary cooling of the 'B' Reactor Recirculation Pump (RRP) seal purge line during the week of October 29, 2018
- (2) Temporary rewiring of safety-related inverter fans during the week of November 5, 2018

71111.19 - Post Maintenance Testing (4 Samples)

The inspectors evaluated post maintenance testing for the following maintenance/repair activities:

- (1) PCIG compressor troubleshooting, relief valve repairs and retest on October 11, 2018
- (2) Unplanned loss of the reactor manual control system following power supply replacements on October 30, 2018
- (3) Planned air leak and troubleshooting of a scram dump valve during the week of December 7, 2018
- (4) Emergent leak repair on the Reactor Water CleanUp (RWCU) regenerative heat exchanger on December 22, 2018

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Routine (1 Sample)

- (1) HC.OP-IS.BJ-0001, HPCI Main and Booster Set Inservice and 2-year Comprehensive Pump testing on December 4, 2018

Inservice (2 Samples)

- (1) Review of HC-18-008, Relief Valve, Low-Low Set Channel Functional Test - Surveillance Test Interval (STI) Evaluation on October 31, 2018
- (2) Review of HC-18-014, Control Room Emergency Filtration System Functional Test -STI Evaluation on October 31, 2018

Cornerstone: Emergency Preparedness

71114.04 Emergency Action Level and Emergency Plan Changes (1 Sample)

The inspectors verified that the changes made to the emergency plan were done in accordance with 10 CFR 50.54(q)(3), and any change made to the Emergency Action Levels, Emergency Plan, and its lower-tier implementing procedures, had not resulted in any reduction in effectiveness of the Plan.

71114.06 - Drill Evaluation

Emergency Planning Drill (1 Sample)

The inspectors evaluated the conduct of a routine PSEG emergency planning drill on December 7, 2018.

RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

71124.01 Radiological Hazard Assessment and Exposure Controls (2 Samples)

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.

High Radiation Area and Very High Radiation Area Controls

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

71124.02 Occupational ALARA Planning and Controls (1 sample)

Radiological Work Planning

The inspectors selected the following radiological work activities based on exposure significance for review:

- RWP 8, Refuel Floor Activities
- RWP 10, Maintenance Support Activities
- RWP 12, ISI and Snubber Activities
- RWP 14, Drywell Maintenance Activities

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification (1 sample)

The inspectors verified PSEG's performance indicator submittals for Safety System Functional Failures from January 1, 2018, through December 29, 2018.

71152 - Problem Identification and Resolution

1. Semiannual Trend Review (1 Sample)

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

2. Annual Follow-up of Selected Issues (1 Sample)

The inspectors reviewed PSEG's implementation of its corrective action program (CAP) related to the following issues:

- (1) NOTF 20791702, HPCI Warm-up line bypass line isolation valve (F100) excessive package leakage during the week of November 26, 2018

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

1. Events (2 Samples)

The inspectors evaluated PSEG's response during the following non-routine evolutions and transients:

- (1) Trip of the '5C' feedwater heater on December 12, 2018
- (2) Safety Relief Valve (SRV) main seat leakage causing condensate induced water hammer and noises in the discharge line to the torus identified on December 20, 2018

2. Licensee Event Reports (1 Sample)

The inspectors evaluated the following LER, which can be accessed at <https://lersearch.inl.gov/LERSearchCriteria.aspx>:

- (1) LER 05000354/2018-004-00, High Pressure Coolant Injection System Inoperable due to Failed Fuse, dated November 20, 2018 (ADAMS Accession: ML18324A614). The circumstances surrounding this LER are documented in the 'Inspection Results' section of this report.

INSPECTION RESULTS

Licensee Identified Non-Cited Violation	71152
This violation of very low safety significant was identified by the licensee and has been entered into the licensee corrective action program and is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.	
<p>Violation: Hope Creek Generating Station Renewed Facility Operating License No. NPF-57, Condition 2.C.15.b.3 requires, in part, that no disbursements or payments from the [decommissioning] trust shall be made by the trustee until the trustee has first given the NRC 30 days' notice of the payment.</p> <p>Contrary to the above, on occasions between 2001 and 2015, disbursements from the Hope Creek Generating Station decommissioning trust were made by the trustee and the trustee had not first given the NRC 30 days' notice of the payment. Specifically, in 2001, 2012, and 2015, PSEG directed the Bank of New York Mellon (the trustee of the decommissioning trust for Hope Creek Generating Station) to disburse payments equaling \$240,449.04 for decommissioning cost estimates. However, PSEG failed to notify the NRC of these disbursements until October 19, 2018 (ML18295A023).</p> <p>Significance/Severity: This issue is considered within the traditional enforcement process because the failure to inform the NRC prior to disbursing decommissioning funds impacts the ability of the NRC to perform its regulatory oversight function. As noted in Section 2.2.4 of the NRC Enforcement Policy, such violations are dispositioned using traditional enforcement.</p> <p>The inspectors evaluated the violation in accordance with the NRC Enforcement Policy and determined that it is appropriately characterized at Severity Level IV (SL IV) because it is similar to the SL IV example violation 6.9.d.7, describing a licensee's failure to provide or make a 15-day or 30-day written report or notification that does not impact the regulatory response by the NRC. For this Hope Creek issue, the inspectors determined that the disbursements were made for acceptable decommissioning expenses and would not have necessitated further inquiry or caused the NRC to object to the payments.</p> <p>Corrective Action Reference: Notification (NOTF) 20808984</p>	

Minor Violation	71152 (1)
<p><u>Minor Violation:</u> During the review of NOTFs written for fire protection activities, the inspectors identified multiple pre-fire plans (PFPs) that were inadequate as well as 29 other PFPs that had been awaiting revision for up to 13 years. The inspectors determined that PSEG not maintaining current, detailed, and accurate PFPs available to the fire brigade was contrary to the HCGS license condition, the Updated Final Safety Analysis Report, and PSEG's implementing procedures and was a performance deficiency within their ability to foresee and correct and which should have been prevented.</p> <p><u>Screening:</u> The inspectors evaluated the issue above in accordance with the guidance in the NRC's Enforcement Policy, IMC 0612, Appendix B, "Issue Screening," and Appendix E,</p>	

“Examples of Minor Issues,” and determined the issue was a minor violation because, although PSEG was not maintaining current, detailed and accurate PFPs, this deficiency did not significantly impact the fire brigade’s ability to fight a fire in the affected fire areas.

Enforcement: PSEG has taken actions to restore compliance by documenting additional NOTFs to revise the inaccurate PFPs identified by the inspectors, as well as planning/scheduling the completion of all revisions to every PFP by January 2019.

PSEG did not comply with HCGS License Condition 2.C.(7) which requires PSEG to implement and maintain in effect all provisions of the approved fire protection program as described in the UFSAR Section 9.5.1.5.3 and Appendix 9A.III.K for Administrative Controls states, in part, that “*Pre-fire plans are written for all safety-related areas.*” Fire Protection Program implementing procedure FP-AA-010, Pre-Fire Plans, requires, in part, that pre-fire plans shall be established for all safety-related areas and areas representing a hazard to safety-related equipment. The procedure also requires that the station establish a formal tracking mechanism to ensure that the pre-fire plans are reviewed and updated as necessary. FP-AA-010 also states that the fire protection supervisor/fire marshal is responsible for ensuring the pre-fire plans are current, including the performance of periodic reviews and updates, as necessary. This constitutes a minor violation that is not subject to enforcement action in accordance with the NRC’s Enforcement Policy.

Observations

71152 (1)

Corrective Action Program (CAP) Evaluations

NRC Inspection Reports (IRs) 2017004 and 2016004, Sections 40A2.2, documented the inspectors’ Semi-Annual Trend reviews of historical CAP evaluations performed each year since 2013. Since 2017, PSEG has implemented the industry initiatives to improve the effectiveness of issue resolution to enhance safety and efficiency within their CAP and the inspectors summarized the CAP data trend below:

Summarized HCGS CAP Information			
	2016 (RFO)	2017	2018 (RFO)
RCEs	1	1	1
ACEs	21	11	10
CCEs	1	6	5
WGEs	66	41	34
Evaluation Totals:	89	59	50
CA Totals:	324*	197	333*
Note: * designate RFO was performed during the calendar year.			

PSEG’s total number of CAP evaluations reduced by approximately 50 percent from 2016 to 2017 and remained approximately the same from 2017 to 2018. Although the number of evaluations dropped, the inspectors noted the number of corrective actions remained consistent over the last three years (when considering the difference between refueling outage (RFO) years and non-RFO years).

Issue Identification, Evaluation and Resolution

The inspectors evaluated a number of notifications generated over the course of the past two quarters by departments that provide input to the quarterly trend reports. The inspectors

determined that, in most cases, issues were appropriately evaluated by PSEG staff for potential trends and resolved within the scope of the CAP. Examples of this are documented below:

1) FLEX Equipment Reliability and Preventive Maintenance

In NRC IR 2018002, the Semi-Annual Trend review section documented an increase in FLEX equipment and preventive maintenance issues. PSEG completed a common cause evaluation (70201140) to address the inspectors' previous concerns about the potential adverse trend, and over the past two quarters there has been a reduction in identified FLEX issues. The FLEX engine control module (ECM) and heater relay failures were addressed by the site replacing all of these components on the susceptible equipment and conducting failure analyses on the failed components. (See NOTFs 20800028, 20796584, 20799580, 20803195, and Order 70201699)

2) Relay Replacements in the Reactor Protection System

During an RF21 RPS relay replacement, the inspectors identified that the relay did not have the required fire protection sealant used as a separation barrier inside of the RPS cabinet. PSEG documented the condition in NOTF 20798788 on June 20, 2018, and NOTF 20800461 on July 18, 2018. The inspectors tracked PSEG's completion of the extent of condition regarding other RPS relays which was performed in December 2018, with no additional deficiencies noted.

However, the inspectors noted a few instances where PSEG was not timely or did not recognize, until prompted by the inspectors, that potential adverse trends existed. Examples of this are documented below:

1) SRV Main Seat Leakage

In NRC IR 2018002, the Semi-Annual Trend review section documented multiple high SRV tailpipe temperatures and conclusions that two of these SRVs, 'H' and 'K', were exhibiting signs of main seat leakage. Then, in NRC IR 2018003, an annual sample conducted for 'H' SRV and 'D' MSL issues documented that on September 5, 2018. On that date, PSEG also initiated NOTF 20803213 recommending that engineering review the conclusions and corrective actions from a 2014 causal evaluation (ACE 70168360) due to the inspector's questions. Upon further review, the inspectors noted that PSEG had not taken action on NOTF 20803213 because even though there was automatic relief valve seat leakage it had not progressed and begun generating cyclic noises associated with condensate induced water hammer. In 2014, these noises associated with condensate induced water hammer occurred in the torus approximately ~20 times/min. October 1, 2018, the inspectors noted that PSEG initiated NOTF 20806044 for degrading conditions associated with the 'H' SRV main leakage, and then documented the reoccurrence of the condensate induced water hammer in the torus in NOTF 20814836 on December 20, 2018. As of December 31, 2018, PSEG initiated actions to develop an adverse condition monitoring (ACM) plan and operation technical decision making (OTDM) document for the issue. In addition, PSEG initiated NOTF 20816775 when the inspectors determined that the 'H' SRV main seat leak rate data from August to December 2018 was incorrect and did not include peer checks.

2) Fire Drills

The inspectors noted during their review that in the last 3 years there has only been one fire drill conducted inside the RCA and that there few variations on fire drill locations. The inspectors observed that the purpose of these fire drills per, FP-AA-014, Fire Protection

Training Program, is to assess the readiness of the fire brigade and the adequacy of the fire-fighting strategies, procedures and PFPs. PSEG acknowledged and documented in NOTF 20815151 the need to vary the location of fire drills and to revise PFPs in a timely manner.

3) Review of Operating Experience (OE) and Vendor Technical Information

The inspectors noted an increase in NOTFs written to address gaps in PSEG's use and review of operating experience and untimely updates to vendor technical information. (See NOTFs 20802555, 20801537, 20801634, 20800447, 20803032, 20800510, 20802580, 20801654, 20802392, and 702022203.)

The inspectors evaluated all of the issues above in accordance with the guidance in IMC 0612, Appendix B, "Issue Screening," and Appendix E, "Examples of Minor Issues," and determined the issues were of minor significance because the inspectors did not identify any CAQs that were not appropriately corrected or scheduled for correction in a reasonable period of time as a result of the failure to implement the NOTF screening process appropriately. Consequently, these issues were not subject to enforcement action in accordance with the NRC's enforcement policy.

Observation	71152 (2.1)
<p>The inspectors reviewed PSEG's corrective actions regarding excessive packing leakage from the HPCI warm-up valve (HD-F-100) during the last operating cycle. PSEG initiated corrective action notification 20791702 on April 3, 2018, and performed an Equipment Reliability Evaluation (RE-70200144). PSEG determined the two causes were low packing gland stress and severe valve stem pitting corrosion. The inspectors reviewed this valve's historical packing leaks, past operability and reportability evaluations, maintenance rule applicability and effects on performance indicators associated with this issue. The inspectors determined that PSEG conducted an appropriate review of the issue, including an adequate extent of condition review and had implemented timely corrective actions to address the causes of the excessive packing leak. The inspectors noted that PSEG had documented packing leaks on this valve on the last four operating cycles going back to 2013. However, the inspectors could not find documentation to show that a corrective action initiated for a June 12, 2013, excessive packing leak under maintenance work order 60111316 to inspect the valve stem for pitting or damage was properly implemented. The inspectors determined this was a missed corrective action opportunity to identify the degraded valve stem for a problem that has since been corrected. The inspectors determined this performance deficiency was minor because the repeated packing leaks did not impact operability of the valve or HPCI system or any other safety related components and did not require an unplanned power reduction or plant shutdown to implement repairs.</p>	

Trip Unit Inadequate Preventive Maintenance			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Reactor Safety – Mitigating Systems	Green NCV 05000354/2018004-01 Closed	P.2 – Problem Identification and Resolution – Evaluation	71153 (2.1)
<p>A Green self-revealing NCV of TS 6.8.1.a, "Procedures and Programs," was identified because PSEG did not adequately establish, implement, and maintain the initial replacement frequency for the Rosemount trip units, which are circuit cards used in various ECCS at</p>			

HCGS. As a result, on September 26, 2018, a failure of the HPCI system high water level trip unit occurred resulting in a blown fuse affecting the operability of HPCI and other 'A' channel ECCS (RHR and CS). This resulted in PSEG entering a 12 hour shutdown TSAS (TS 3.5.1.c.2), an 8 hour non-emergency report (EN# 53625) for the HPCI system being inoperable, and an LER for a condition that could have prevented the fulfillment of a safety function.

Description: HGCS utilizes over 200 individual Rosemount trip modules in 42 functional locations throughout the plant, mainly in the reactor protection, reactor recirculation, and ECCS. The HPCI trip logic is performed by these Rosemount trip units as they are arranged in card files containing multiple units which share a common fuse.

On September 26, 2018, while operating at 100 percent power, PSEG received indications in the main control room that the HPCI system had become inoperable due to a failed fuse in channel 'A' of the system initiating logic. This failed fuse also affected the 'A' channel of the core spray and LPCI sub-systems. PSEG's immediate investigation isolated the fuse failure to a single component, a Rosemount trip unit, associated with the HPCI system high water level trip (level 8). With the fault isolated by PSEG's troubleshooting, operability was restored to the affected 'A' channel ECCS after being in a 12 hour shutdown TS for 6 hours. PSEG restored HPCI system operability by replacing the failed trip unit on September 27, 2018. As a result, PSEG reported this as a condition that could have prevented the fulfillment of a safety function under 10 CFR 50.73(a)(2)(v)(D) to the NRC as LERs 05000354/2018-004-00, High Pressure Coolant Injection System Inoperable due to Failed Fuse, on November 20, 2018.

On December 11, 2018, PSEG completed a causal evaluation (ERE 70203043) for the failed HPCI trip unit. This evaluation determined that the C25 capacitor in the Rosemount slave trip unit, model 510DU7, failed after being installed in the plant for 32 years (manufactured ~39 years ago). PSEG concluded that even though a Part 21 on these C25 capacitors failing had been issued in 1999, this failure was random due to the low frequency of occurrence in the industry and at HCGS. PSEG's corrective actions included replacing the failed trip unit and associated fuse, conducting a failure analysis on the failed trip unit, creating actions to implement a trip unit reliability strategy (either to replace all or replace selected trip units) as recommended by the circuit card performance team and plant health committee (PHC).

The inspectors reviewed PSEG's evaluation and questioned PSEG about the Part 21 issued in 1999. Rosemount had issued the Part 21 (1999-31-0) for failures of the C25 capacitor on trip units manufactured prior to date code 8630 (week 30 of 1986). The Part 21 recommended further examination to determine if pre-8630 capacitors were installed and whether or not replacement was warranted. The inspectors noted that PSEG's follow-up actions for the Part 21 reviewed under CR990624091 were to inspect and repair the trip units in stock. These actions were put into PSEG's corrective action program under 60012450, 80002672, and 20042758, but were never completed.

The inspectors then questioned PSEG's review and implementation of the Circuit Card – Rosemount Trip Unit preventive centered maintenance (PCM) template. PSEG initially performed a PCM template evaluation for Rosemount trip units in 2009 (Order 70083963) and then due to PCM template revisions, re-reviewed their own maintenance strategy and their justification in 2015 (70157122, 70162269, 70172811) and 2017 (70169938). The PCM template recommended replacement of the 510DU7 and 710DU trip units on an 18 year frequency. Although this maintenance strategy was approved by PSEG's PHC in 2009, PSEG did not approve funding citing the potential large expense and low failure rate of the

units over the life of the plant. PSEG's conclusion in 2009, was re-evaluated in 2015 and 2017, with no additional justification for the decision. PSEG did not create preventive maintenance activities for the replacement of selected trip units based on the risk associated with the trip unit's failure.

The inspectors reviewed the most recent PCM template revision for Circuit Card – Rosemount Trip Units from October 2014. This revision was reviewed by PSEG under 2014 NOTF 20664484 and 2017 Order 70169938 which 'cut, copied, and pasted' the 2009 PCM template evaluation under 2009 Order 70083963 ('09) which recommends replacement or refurbishment of the model 510DU7 trip units on a 12 year frequency. The PCM template also states that "the maximum replacement frequency for any critical card should be 30 years." And that "the 30 year maximum attempts to limit the vulnerability of the plant to circuit card failures from the long term effects of corrosion, vibration, trace degradation, and all of a circuit card's failure mechanisms."

Also, the inspectors found that up until February 2018, PCM template implementation evaluations were performed using Section 4.14 of PSEG procedure MA-AA-716-210-1001. Section 4.14.9 requires compilation of information necessary to evaluate the PCM template recommendations, including external documents and industry operating experience (OPEX). PSEG's own OPEX search that was conducted as part of their causal evaluation (ERE 70203043) yielded 4 distinct recent events involving the failure of a C25 capacitor on a Rosemount trip unit that resulted in impacts to other safety-related systems and entry into short duration shutdown TSAs (NMP '16, Perry '13 & '10, Limerick '09). PSEG procedure MA-AA-716-210 (now ER-AA-210), Preventive Maintenance (PM) Program, Section 4.2.4 PCM Template Process, states that "*all PM's that deviate from the PCM template recommendations require a justification documented in the PM Change Process.*"

Because of this, the inspectors determined that the justification used by PSEG to not implement a replacement frequency for their Rosemount trip units in 2017, was inadequate because it did not address the revised replacement/refurbishment frequency of 12 years for the Rosemount trip units, the maximum recommended replacement frequency of 30 years for any critical circuit card, or recent industry operating experience involving similar trip unit failures.

Corrective Actions: PSEG's corrective actions included replacing the failed trip unit and associated fuse, conducting a failure analysis on the failed trip unit, and creating actions to implement a trip unit reliability strategy (either to replace all or replace selected trip units) as recommended by the circuit card performance team and plant health committee (PHC).

Corrective Action Reference: 20806069.

Performance Assessment:

Performance Deficiency: PSEG did not adequately establish, implement, and maintain the initial replacement frequency for the Rosemount trip units. This represented a performance deficiency that was reasonably within the licensee's ability to foresee and correct and should have been prevented.

Screening: The performance deficiency was determined to be more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone, and adversely affected the cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, in this case, because PSEG did not adequately justify the

replacement frequency for the trip units which resulted in the loss of safety related ECCS equipment, loss of RPS redundancy, and entry into a short duration shutdown TSAS.

Significance: The inspectors determined that this finding was of very low safety significance (Green) using NRC IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2 – Mitigating Systems Screening Questions, dated July 1, 2012, because the finding did not represent a loss of system and/or function, did not represent an actual loss of function of at least a single train for greater than its TS allowed outage time or an actual loss of function of one or more non-TS trains of equipment designated as high safety-significant in accordance with PSEG's maintenance rule program for greater than 24 hours.

Cross-Cutting Aspect: This finding is related to the cross-cutting area of Problem Identification and Resolution, Evaluation, because PSEG did not thoroughly evaluates issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, the inspectors determined that PSEG did not thoroughly re-evaluate the PM replacement justification for safety-related Rosemount trip units in 2017. (P.2)

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 of RG 1.33, Revision 2, Appendix A, recommends procedures for performing maintenance, including: a. maintenance that can affect the performance of safety-related equipment should be properly pre-planned and performed in accordance with written procedures and documented instructions appropriate to the circumstances; and, b. preventive maintenance schedules should be developed to specify the inspection or replacement of parts that have a specific lifetime. In 2017, PSEG's procedure MA-AA-716-210-1001 for PCM template implementation evaluations details the implementation evaluation process which formally documents and justifies PSEG's approved maintenance strategies.

Contrary to the above, between 2009 and 2017, PSEG did not adequately establish, implement, and maintain the initial replacement frequency for the for Rosemount trip units, which are circuit cards used in various ECCS at HCGS. As a result, on September 26, 2018, a failure of the HPCI system trip unit occurred resulting in a blown fuse affecting the operability of both HPCI and 'A' channel ECCS. This resulted in PSEG entering a 12 hour shutdown Technical Specification, an 8 hour non-emergency report for the HPCI system being inoperable, and an LER for a condition that could have prevented the fulfillment of a safety function. PSEG's corrective actions included replacing the failed trip unit and associated fuse and creating actions to implement a trip unit reliability strategy.

Disposition: This violation is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy.

Observation	71153 (2.1)
<u>Licensee Event Report 05000354/2018-004-00: High Pressure Coolant Injection System Inoperable due to Failed Fuse</u>	
<p>On September 26, 2018, while operating at 100 percent power, PSEG received indications in the main control room that the HPCI system had become inoperable due to a failed fuse in channel 'A' of the system initiating logic. This failed fuse also affected the 'A' channel of the core spray and LPCI sub-systems. PSEG's investigation isolated the fuse failure to a single component, a Rosemount trip unit, associated with the HPCI system high water level trip (level 8). With the fault isolated, operability was restored to the affected 'A' channel emergency core cooling systems. PSEG restored HPCI system operability by replacing the failed trip unit on September 27, 2018. As a result, PSEG reported this to the NRC as a condition that could have prevented the fulfillment of a safety function under 10 CFR 50.73(a)(2)(v)(D) as LER 05000354/2018-004-00, High Pressure Coolant Injection System Inoperable due to Failed Fuse, on November 20, 2018. The inspectors performed inspections documented in the Maintenance Effectiveness (71111.12) and Performance Indicator Verification (71151) Sections of this report. The inspectors identified a performance deficiency during the review of this LER and related inspections of the Rosemount trip unit that is documented below. This review closes LER 05000354/2018-004-00.</p>	

EXIT MEETINGS AND DEBRIEFS

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

- On November 29, 2018 the inspector presented the inspection results of PSEG's implementation of its corrective action program related to the HPCI warmup valve excessive to Tanya Timberman, Regulatory Compliance. The inspectors verified no proprietary information was retained or documented in this report.
- On November 30, 2018, the inspector presented the radiation safety inspection results to H. Trimble, Radiation Protection Manager, and other members of the licensee staff. The inspectors verified no proprietary information was retained or documented in this report.
- On January 16, 2019, the inspectors presented the quarterly resident inspector inspection results to Mr. Eric Carr, Site Vice President, and other members of the PSEG staff.

THIRD PARTY REVIEWS

The inspectors reviewed Institute of Nuclear Power Operations reports that were issued during the inspection period.

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

HC.OP-AB.MISC-0001, Acts of Nature, Revision 33

HC.OP-GP.ZZ-0003, Station Preparations for Winter Conditions, Revision 31

Notifications

20810731	20811656	20811719	20811837	20811932	20811933
20811934	20813248				

Section 1R04: Equipment AlignmentProcedures

HC.OP-FT.KL-0001, Primary Containment Instrument Gas System Comprehensive Capacity Test, Revision 1

HC.OP-ST.KJ-0003, Emergency Diesel Generator 1CG400 Operability Test, Revision 77

Notifications

20798788	20802492	20803055	20803058	20812962*
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Maintenance Orders/Work Orders

60139934	60140087	70202651
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Section 1R05: Fire ProtectionProcedures

AD-AA-101-1005, Procedure Revision Priority Coding and Expectations, Revision 1

FP-AA-010, Pre-Fire Plans, Revision 1

FRH-II-531, HC PFP Diesel Generator Rooms, Revision 8

FRH-II-541, Class 1E Switchgear Rooms 130' Elevation, Revision 7

FRH-II-562, HC PFP HVAC Equipment, Inverters and Batteries 163' Elevation, Revision 5

FRH-III-151, HC PFP Turbine Building 137' Elevation, Revision 4

FRH-III-321, Cable Tray Area and Battery Rooms 87' Elevation, Revision 5

Notifications (*initiated in response to inspection)

20810330*	20810592*	20810740*	20424016	20629300	20803887
20812821	20814931	20816586			

Maintenance Orders/Work Orders

60141360	70153147	70204994	80122358
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Miscellaneous

Hope Creek Fire Protection Completed Fire Drill List from 2016 through 2018

Hope Creek Fire Protection Night Order / Shift Communication dated October 31, 2018

Hope Creek Fire Protection List of Outstanding Pre-Fire Plan Revisions dated November 15, 2018

Section 1R06: Flood Protection MeasuresProcedures

HC.OP-ST.EA-0002, Service Water System Functional Test – 18 Months, Revision 5

Maintenance Orders/Work Orders

50185261 50189406 50190174

Miscellaneous

HC-PRA-012, Hope Creek Generating Station Probabilistic Risk Assessment Internal Flood Notebook, Revision 3

Section 1R11: Licensed Operator Regualification ProgramMiscellaneous

ESG-015, RWCU Pump Trip, Loss of 10D410, Turbine Vibrations, LOP/LOCA, Rx Flooding, dated November 7, 2018

Section 1R12: Maintenance EffectivenessProcedures

ER-AA-210, Preventive Maintenance (PM) Program, Revision 0
 ER-AA-310-1002, Maintenance Rule – SSC Risk Significance Determination, Revision 7
 ER-AA-600-1015, FPIE PRA Model Update, Revision 8
 ER-AA-600-1044, Maintenance Rule Support, Revision 5
 HC-MRULE-001, HCGS Probabalistic Risk Assessment – HC Maintenance Rule Risk Significance Catergorization, Revision 3
 LS-AA-115, Operating Experience Program, Revision 16
 MA-AA-716-210-1001, Performance Centered Maintenance (PCM Templates), Revision 13

Notifications

20808273 20808338 20809870 20810854

Maintenance Orders/Work Orders

60140456 70083963 70157122 70162269 70172811 70203043
 70204092

Miscellaneous

HC Troubleshooting Plan 18-168
 MTG-2018-00212

Section 1R13: Maintenance Risk Assessments and Emergent Work ControlProcedures

HC.OP-FT.KJ-0003, Emergency Diesel Generator 1CG400 – Functional Test, Revision 9
 HC.OP-IS.BH-0003, Standby Liquid Control Pump AP208 – Inservice Test, Revision 16
 OP-HC-108-115-1001, Operability Assessment and Equipment Control Program, Revision 36
 WC-AA-101, On-line Work Management Process, Revision 25

Notifications (*initiated in response to inspection)

20807472*	20777837	20779618	20784239	20794566	20794567
20794715	20798272	20798273	20800410	20807066	20807078
20807499	20807625				

Maintenance Orders/Work Orders

30322641	60139612	60139613	70197036
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Miscellaneous

Hope Creek Generating Station On-Line Risk Assessment, Work Week 842, Applicable Period
10/14/18 – 10/20/18, Revision 0

Hope Creek Generating Station On-Line Risk Assessment, Work Week 842, Applicable Period
10/14/18 – 10/20/18, Revision 1

Section 1R15: Operability Determinations and Functionality AssessmentsProcedures

HC.IC-CC.BB-0062, Nuclear Boiler – Division 4 Channel B21-N707D Safety Relief Valve
B21-F013P Low-Low Set, Revision 9

HC.IC-FT.BB-0073, Channel A – CS, HPCI, RHR, PCIS Rosemount Trip Units, Revision 6

HC.OP-IS.BC-0104, Residual Heat Removal Subsystem D Valves – Inservice Test, Revision 28

HC.OP-IS.BF-0101, Control Rod System Valves – Inservice Test, Revision 21

OP-AA-108-101-1002, Component Configuration Control, Revision 11

Notifications

20734665	20756667	20772331	20800262	20801704	20806153
20808531	20811707				

Maintenance Orders/Work Orders

30229368	50183099	50194371	50197720	50199947	50202024
50204029	50204150	50204881	50205499	50205829	50206068
60138614	60139795	70195608			

Section 1R18: Plant ModificationsProcedures

HC.OP-AB.RPV-0003, Recirculation System/Power Oscillations, Revision 32

Notifications

20793755	20795331	20795496	20796552	20801395
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Maintenance Orders/Work Orders

80122350	80122499
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Miscellaneous

TCCP 4HT-13-008, Temporary Cooling for the Recirculation Pump Seal Purge Line

TCCP 4HT-18-012, Temporary Cooling for the Recirculation Pump Seal Purge Line

Section 1R19: Post-Maintenance TestingProcedures

HC.OP-FT.KL-0001, Primary Containment Instrument Gas System Compressor Capacity Test, Revision 1

Notifications

20769194 20802492 20808273 20808338 20816502 20816638

Maintenance Orders/Work Orders

30266260 60135779 60135861 60140047 60140456 60141422
80124125

Section 1R22: Surveillance TestingProcedures

ER-AA-450, Implementation of the Technical Specification Surveillance Frequency Control Program, Revision 2

HC.OP-IS.BJ-0002, HPCI Jockey Pump – AP228 – Inservice Test, Revision 35

LS-AA-106-101, Station Review Committee, Revision 0

Notifications

20743957 20803682

Maintenance Orders/Work Orders

30326348 50192426 50194073 50206595

Miscellaneous

HC-14-014, Control Room Emergency Filtration System Functional Test STI Evaluation, Revision 0

HC-18-008, Relief Valve, Low-Low Set Channel Functional Test Surveillance Test Interval (STI) Evaluation, Revision 0

HC-STI-022, Risk Evaluation of Surveillance Interval Extension for Low-Low Set SRV Operability Test, Revision 0

HC-STI-027, Risk Evaluation of Control Room Emergency Filtration System Functional Test, Revision 0

Hope Creek Lubricating Oil Report for H1FD-10-S-211 dated October 10, 2018

Section 1EP4: Emergency Action Level and Emergency Plan ChangesMiscellaneous

2018-02, OP-AA-101-111, Roles and Responsibilities of On Shift Personnel, Revision 10

2018-21, 80111425 - 2R19A-D Steam Generator Blowdown Radiation Monitors

2018-24, NC.EP-EP.ZZ-0309 Dose Assessment (MIDAS) Instructions Revision 16

2018-56, Emergency News Center as Backup Emergency Operations Facility

Section 1EP6: Drill EvaluationProcedures

EP-AA-125-1002, NRC Drill and Exercise Performance (DEP) Indicator Guidance, Revision 5

EP-HC-111-131, Hope Creek Wall Chart (Hot), Revision 1

Section 4OA1: Performance Indicator VerificationProcedures

LS-AA-2001, Collecting and Reporting of NRC Performance Indicator Data, Revision 11

LS-AA-2080, Monthly Data Elements for NRC Safety System Functional Failures, Revision 5

Notifications

20791702 20793327 20795822 20799118 20804677

Miscellaneous

Licensee Event Report 2018-004-00, HPCI System Inoperable due to Failed Fuse dated
November 20, 2018

Section 4OA2: Problem Identification and ResolutionProcedures

AD-AA-101-1005, Procedure Revision Priority Coding and Expectations, Revision 1

FP-AA-010, Pre-Fire Plans, Revision 1

FRH-II-531, HC PFP Diesel Generator Rooms, Revision 8

FRH-II-541, Class 1E Switchgear Rooms 130' Elevation, Revision 7

FRH-II-562, HC PFP HVAC Equipment, Inverters and Batteries 163' Elevation, Revision 5

FRH-III-151, HC PFP Turbine Building 137' Elevation, Revision 4

FRH-III-321, Cable Tray Area and Battery Rooms 87' Elevation, Revision 5

MA-AA-734-497, General Instructions for Valve Packing, Revision 2

Notifications (*initiated in response to inspection)

20806786*	20810330*	20810592*	20810740*	20813616*	20813616*
20424016	20598193	20611741	20629300	20684715	20722147
20723341	20723902	20745308	20775917	20791702	20791711
20791825	20791925	20791980	20792057	20793043	20793128
20793394	20796584	20803400	20803533	20803887	20812821
20816586					

Maintenance Orders/Work Orders

30325064	60106987	60111316	60122804	60131857	60140081
60140086	70069106	70153147	70165058	70185270	70185287
70200128	70200144	70200239	70201140	70201699	70202630
70204994	80122059	80122358			

Miscellaneous

Hope Creek Fire Protection Completed Fire Drill List from 2016 through 2018

Hope Creek Fire Protection List of Outstanding Pre-Fire Plan Revisions dated November 15,
2018

Hope Creek Fire Protection Night Order / Shift Communication dated October 31, 2018

Hope Creek Troubleshooting Plan 16-056

Hope Creek Troubleshooting Plan 18-195

71153- Follow-Up of Events and Notices of Enforcement DiscretionProcedures

HC.OP-AB.BOP-0001, Feedwater Heating, Revision 20

HC.OP-SO.AF-0001, Extraction Steam, Heating Vents and Drains System Operation,
Revision 57

HC.OP-ST.GS-0003, Reactor Building/TORUS Vacuum Breaker Operability Test – Monthly,
Revision 9

Notifications

20814957 20815533

Maintenance Orders/Work Orders

50195246 60141343