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

May 9, 2017

EA-17-071

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 AND EXERCISE OF ENFORCEMENT DISCRETION 05000354/2017001

Dear Mr. Sena:

On March 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Hope Creek Generating Station (HCGS). On April 13, 2017, the NRC inspectors discussed the results of this inspection with Mr. Edward Casulli, Plant Manager, and other members of your staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented two self-revealing findings of very low safety significance (Green) in this report. Both of these findings involved violations of NRC requirements. 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 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 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.

In addition to the issues identified above, a violation of Technical Specification 3.6.5.1 involving a failure to set secondary containment during operations with the potential to drain the reactor vessel (OPDRVs) was identified during the Hope Creek refueling outage. Because the violation was identified during the discretion period described in Enforcement Guidance Memorandum 11-003, Revision 3, the NRC is exercising enforcement discretion in accordance with Section 3.5, “Violations Involving Special Circumstances,” of the NRC Enforcement Policy and, therefore, will not issue enforcement action for this violation, subject to a timely license amendment request being submitted.

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 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Michael L. Scott, Director
Division of Reactor Projects

Docket No. 50-354
License No. NPF-57

Enclosure:
Inspection Report 05000354/2017001
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

SUBJECT: HOPE CREEK GENERATING STATION UNIT 1 – INTEGRATED INSPECTION REPORT AND EXERCISE OF ENFORCEMENT DISCRETION 05000354/2017001 DATED MAY 9, 2017

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REGION I

Docket No.	50-354
License No.	NPF-57
Report No.	05000354/2017001
Licensee:	PSEG Nuclear LLC (PSEG)
Facility:	Hope Creek Generating Station (HCGS)
Location:	Hancocks Bridge, NJ 08038
Dates:	January 1, 2017 through March 31, 2017
Inspectors:	J. Hawkins, Senior Resident Inspector S. Haney, Resident Inspector P. Boguszewski, Resident Inspector (Acting) B. DeBoer, Health Physicist N. Floyd, Resident Inspector (Acting) J. Furia, Senior Health Physicist H. Gray, Senior Reactor Inspector J. Nicholson, Senior Health Physicist J. Patel, Senior Reactor Inspector J. Schoppy, Senior Reactor Inspector, Team Leader
Approved By:	Michael L. Scott, Director Division of Reactor Projects

Enclosure

TABLE OF CONTENTS

SUMMARY

Inspection Report (IR) 05000354/2017001; 01/01/2017 – 03/31/2017; Hope Creek Generating Station; Problem Identification and Resolution, Follow-Up of Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. The inspectors identified two self-revealing findings of very low safety significance (Green), both of which were non-cited violations (NCVs). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process (SDP)," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

Cornerstone: Mitigating Systems

- Green. A self-revealing very low safety significance (Green) NCV of Title 10 of the *Code of Federal Regulations* (10 CFR) 50, Appendix B, Criterion VIII, "Identification and Control of Materials, Parts and Components," was identified because PSEG did not have adequate control measures to prevent the use of defective parts. Specifically, following the 'C' emergency diesel generator (EDG) speed switch (SS) failure on August 4, 2016, PSEG's control measures did not prevent the installation of the previously failed SS, with susceptible degradation due to the component's previous failure history, known manufacturing and design deficiencies, and damage sustained during the receipt inspection process, into the 'A' EDG on January 6, 2017. Consequently, less than one month later on February 3, 2017, the 'A' EDG failed to start due to a failed SS. PSEG's corrective actions (CAs) included replacing the SS, identifying an equivalent replacement for the currently installed SS design, scheduling the replacement of the new SSs, and performing extent of condition inspections and testing of all the installed and spare EDG SSs.

  The issue was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, PSEG's installation of a previously failed SS, with susceptible degradation due to the component's previous failure history, known manufacturing and design deficiencies, and damage sustained during the receipt inspection process, into the 'A' EDG on January 6, 2017, led to the 'A' EDG failing to start on February 3, 2017. In accordance with IMC 0609.04, "Initial Characterization of Findings," dated October 7, 2016, and Exhibit 2 of IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012, the inspectors determined that this finding was Green because it was not a design or qualification deficiency, did not involve an actual loss of safety function, did not represent the actual loss of a safety function of a single train for greater than its technical specifications (TSs) allowed outage time, and did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety-significant in PSEG's maintenance rule program (MRP) for greater than 24 hours. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because PSEG did not thoroughly evaluate issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance.

Specifically, PSEG did not thoroughly evaluate their previous failure analyses (FA) performed on the failed SSs to ensure that resolutions addressed the actual failure mode [P.2]. (Section 4OA2.2)

- Green. A self-revealing Green non-cited violation (NCV) of TS 6.8.1, "Procedures," was identified because PSEG did not establish an appropriate preventive maintenance (PM) schedule for the high pressure coolant injection (HPCI) overspeed trip system reset spring. Specifically, PSEG's major inspection PM frequency and scope justification for the HPCI turbine major inspection and overhaul PM was determined to be inadequate. As a result, the HPCI overspeed tappet reset spring was not replaced for 8.5 years, resulting in the reset spring's force falling below the required force range. As a result, on April 7, 2016, the HPCI turbine tripped and then reset shortly after being started because of the low reset spring force, making the HPCI system unable to automatically initiate and inject at rated flow within 35 seconds as required per TSs. PSEG's immediate CAs included replacing the reset spring, adding replacement of the spring to the 6.87 year HPCI environmental qualification (EQ) PM, and evaluating the storage requirements for similar springs in inventory.

  The issue 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 inadequate PM frequency and scope for the reset spring resulted in the low spring force due to the spring's age allowing the trip tappet assembly to float upward on a HPCI system start-up and tripping the turbine when no actual overspeed condition existed. In accordance with IMC 0609.04, "Initial Characterization of Findings," dated October 7, 2016, and Exhibit 2 of IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012, the inspectors determined that this finding was Green because it was not a design or qualification deficiency, did not involve an actual loss of safety function, did not represent the actual loss of a safety function of a single train for greater than its TS allowed outage time and did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety-significant in PSEG's MRP for greater than 24 hours. Specifically, following the overspeed trip on April 7, 2016, HPCI was restored to operable status in approximately 36 hours. The inspectors determined there was no cross-cutting aspect associated with this finding since it was not representative of current PSEG performance as the inadequate PM schedule for the HPCI overspeed trip tappet assembly reset spring involved multiple missed opportunities to re-evaluate the PM scope and frequency from 2005 through 2009. In accordance with IMC 0612, the causal factors associated with this finding occurred outside the nominal three-year period of consideration and were not considered representative of present performance. (Section 4OA3.1)

REPORT DETAILS

Summary of Plant Status

Hope Creek Generating Station began the inspection period at full rated thermal power (RTP). On February 24, 2017, operators reduced power to approximately 35 percent to support planned main turbine valve testing, control rod scram time testing, control rod sequence exchange, and to repair a leak on an extraction steam line valve. The unit was returned to 100 percent RTP on February 26, 2017. The unit remained at or near full 100 percent for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 1 sample)

Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors reviewed PSEG's preparations for the onset of impending winter storm, including four to six inches of snow/ice on January 6 through 7. The inspectors reviewed the implementation of adverse weather preparation procedures before the onset of and during this adverse weather condition. The inspectors walked down the EDGs and station service water (SSW) system to ensure system availability. The inspectors verified that operator actions defined in PSEG's adverse weather procedure maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel. Documents reviewed for each section of this IR are listed in the Attachment.

b. Findings

No findings were identified.

1R04 Equipment Alignment

Partial System Walkdown (71111.04Q – 4 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- 'B' electrohydraulic control (EHC) pump during 'A' EHC leak repair during the week of January 3
- 'B' control room ventilation system during maintenance on the 'A' control room emergency filtration system on February 7
- HPCI system during maintenance on the reactor core isolation cooling (RCIC) system on February 22
- 'A' core spray (CS) during maintenance on 'B' CS on March 13

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

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Resident Inspector Quarterly Walkdowns (71111.05Q – 5 samples)

a. Inspection Scope

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

- FRH-II-561, Control equipment heating, ventilation and air conditioning, inverter and battery rooms on January 11
- FRH-III-123, EHC power unit area, week of January 27
- FRH-III-151, Rooms 1516 and 1517, 'A' and 'B' reactor recirculation pump (RRP) motor generator set rooms on February 8
- FRH-II-713, SW intake structure on February 16
- FRH-II-442, Filtration recirculation ventilation system recirculation unit area on March 1

b. Findings

No findings were identified.

.2 Fire Protection – Drill Observation (71111.05A – 1 sample)

a. Inspection Scope

The inspectors observed a fire brigade drill scenario conducted on January 11 that involved a simulated fire in the HCGS EDG and auxiliary building ventilation system. The inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that PSEG personnel identified deficiencies, openly discussed them in a self-critical manner at the post-drill debrief, and took appropriate CAs as required. The inspectors evaluated the following specific attributes of the drill:

- Proper wearing of turnout gear and self-contained breathing apparatus (SCBA)
- Proper use and layout of fire hoses
- Employment of appropriate fire-fighting techniques
- Sufficient fire-fighting equipment brought to the scene
- Effectiveness of command and control
- Search for victims and propagation of the fire into other plant areas
- Smoke removal operations
- Utilization of pre-planned strategies
- Adherence to the pre-planned drill scenario
- Drill objectives met

The inspectors also evaluated the fire brigade's actions to determine whether these actions were in accordance with PSEGs fire-fighting strategies.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (711111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the 'A' and 'B' fuel pool cooling and cleanup (FPCC) heat exchangers (HXs) readiness and availability to perform their safety functions. The inspectors reviewed the design basis for the component. The inspectors reviewed the results of previous inspections on the HXs. The inspectors discussed the results of the most recent inspection with engineering staff and reviewed pictures of the as-found and as-left conditions. The inspectors verified that PSEG initiated appropriate CAs for identified deficiencies. Because these are plate-type HXs, the inspectors also verified that the HXs did not exhibit any external leakage during previous examinations.

b. Findings

No findings were identified.

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

.1 Quarterly Review of Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on March 7, which included a seismic event followed by a loss of a vital 4.16 kiloVolt (kV) bus, complete loss of condenser vacuum, loss of coolant accident (LOCA), and failure of multiple emergency core cooling system (ECCS) components. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and the TS action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors observed and reviewed a planned down power to support unlocking the 'B' RRP scope tube following an undemanded speed change and system troubleshooting on March 13. The inspectors observed reactivity manipulations to verify that procedure use and crew communications met established expectations and standards. The inspectors observed pre-job briefings to verify that the briefings met the criteria specified in OP-AA-101-111-1004, "Operations Standards," Revision 7, and HU-AA-1211, "Pre-Job Briefings," Revision 13. Additionally, the inspectors observed licensed operator performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component (SSC) performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance WOs, and maintenance rule (MR) basis documents to ensure that PSEG

was identifying and properly evaluating performance problems within the scope of the MR. For each sample selected, the inspectors verified that the SSC was properly scoped into the MR in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by PSEG staff was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and CAs to return these SSCs to (a)(2). Additionally, the inspectors ensured that PSEG staff was identifying and addressing common cause failures that occurred within and across MR system boundaries.

- Review of the AVH-415 'A' control room return air ventilation fan trip failure due to low flow on November 23, 2016

b. Findings

No findings were identified.

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

a. Inspection Scope

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

- Protected equipment and risk assessment for a Bailey cabinet power supply monitor failure on January 11
- Protected equipment and risk assessment for 'B' RRP undemanded speed change testing during the week of January 27
- Protected equipment and risk assessment for 'A' EDG maintenance during the week of January 30
- Protected equipment and risk assessment for 'B' EDG maintenance on February 14
- Protected equipment and risk assessment for 'B' control room emergency filtration (CREF) maintenance the week of March 20
- Protected equipment and risk assessment for 'B' residual heat removal (RHR) maintenance and 'A' reactor water cleanup maintenance the week of March 27

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 5 samples)

a. Inspection Scope

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

- Review of 'A' FPCC pump with high oil viscosity during the week of February 20
- Review of the 'A' RHR minimum flow valve failure to close during the week of February 25
- Review of the fuel conditioning limit being exceeded during power ascension during the week of February 27
- Review of the #4 turbine stop valve (TSV) position input to the reactor protection system (RPS) during the week of March 1
- Review of the EDG SS voltage regulator chip (LM317) potential degradation during the week of March 22

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

b. Findings

No findings were identified.

1R17 Evaluations of Changes, Tests, or Experiments (IP 71111.17T - 29 samples)

a. Inspection Scope

Three inspectors from the NRC Region I Office completed an inspection between March 27 - 31, 2017, to verify that PSEG staff performed proper screening and evaluations of changes and tests in accordance with regulatory requirements and PSEG implementing guidance. The team specifically reviewed four safety evaluations to evaluate whether the changes to the facility or procedures, as described in the UFSAR, had been reviewed and documented in accordance with 10 CFR 50.59 requirements. The safety evaluations were sampled from those completed by PSEG staff since the last NRC inspection of this area and had not been previously reviewed by NRC inspectors. In addition, the team evaluated whether PSEG staff had been required to obtain NRC approval prior to implementing the changes. The team interviewed PSEG staff and reviewed supporting information including calculations, analyses, design change documentation, procedures, the UFSAR, the TSs, and plant drawings to assess the adequacy of the safety evaluations. The team compared the safety evaluations and supporting documents to the guidance and methods provided in Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Evaluations," as endorsed by NRC Regulatory Guide (RG) 1.187, "Guidance for Implementation of 10 CFR 50.59,

Changes, Tests, and Experiments," to determine the adequacy of the safety evaluations.

The team also reviewed a sample of 25 screenings and applicability determinations for which PSEG staff had concluded that a 50.59 safety evaluation was not required to be performed. These reviews were performed to assess whether PSEG's threshold for performing safety evaluations was consistent with 10 CFR 50.59. The sample included design changes, calculations, and procedure changes. The screenings and applicability determinations were selected based on the safety significance, risk significance, and complexity of the change to the facility.

In addition, the team compared PSEG's implementing administrative procedures used to control the screening, preparation, review, and approval of safety evaluations to the guidance in NEI 96-07 to evaluate whether those procedures adequately implemented the requirements of 10 CFR 50.59.

The team verified that PSEG staff entered performance issues concerning their 50.59 program into their CAP. The team verified that PSEG staff developed appropriate CAs to address those issues.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Permanent Modifications

a. Inspection Scope

The inspectors evaluated a modification, design change package (DCP 80098304) that replaced the internal motor control center (MCC) components associated with the 10B212. The inspectors verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. In addition, the inspectors reviewed modification documents associated with the upgrade and design change. The inspectors also reviewed revisions to the operating and control room alarm response procedures and interviewed engineering and operations personnel to ensure the procedures could be reasonably performed.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 6 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis

and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- Replacement of the 'A' EDG SS after erroneous speed indication during monthly EDG testing (Order 60133121) during the week of January 9
- Replacement of failed power supply monitor for Bailey cabinet 1C-C-652 (Order 60133175) during the week of January 17
- Replacement of the 'A' EDG SS, after causing the 'A' EDG to fail to start, (Order 50192180) on February 3
- Replacement of torque switch for RCIC turbine lube oil cooling water valve (Order 30227757) on February 23
- 'B' standby liquid control (SLC) pump valve and discharge relief valve replacement (Order 30260751) on March 16
- PM on 'B' RHR motor and installation of new style torque switches on 'B' RHR minimum flow valve (Order 30153325) on March 28.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 4 samples)

a. Inspection Scope

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

- 'A' loop ECCS jockey pump in-service testing (IST) on December 6 (IST)
- 'A' EDG monthly ST on January 6
- HPCI in-service testing on January 10 (IST)
- CREF system functional monthly ST on January 11

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstones: Occupational and Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01 - 1 sample)

a. Inspection Scope

The inspectors reviewed PSEG's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR Part 20, TSs, RG 8.38, and the procedures required by TSs as criteria for determining compliance.

Radiological Hazard Assessment

The inspectors conducted independent radiation measurements during walkdowns of the facility and reviewed the radiological survey program, air sampling and analysis, continuous air monitor use, recent plant radiation surveys for radiological work activities, and any changes to plant operations since the last inspection to verify survey adequacy of any new radiological hazards for onsite workers or members of the public.

b. Findings

No findings were identified.

2RS2 Occupational As Low As Is Reasonably Achievable Planning and Controls (71124.02 - 1 sample)

a. Inspection Scope

The inspectors assessed PSEG's performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements contained in 10 CFR Part 20, RGs 8.8 and 8.10, TSs, and procedures required by TSs as criteria for determining compliance.

Radiological Work Planning

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

- Radiation Work Permit (RWP) 8, Refuel Floor Activities
- RWP 10, Maintenance Support Activities
- RWP 11, local leak rate test (LLRT) Activities
- RWP 12, ISI Activities

For each of these activities, the inspectors reviewed: ALARA work activity evaluations, exposure estimates, exposure reduction requirements, results achieved (dose rate reductions, actual dose), person-hour estimates and results achieved and post-job reviews that were conducted to identify lessons learned.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the control of in-plant airborne radioactivity and the use of respiratory protection devices in these areas. The inspectors used the requirements in 10 Part CFR 20, RG 8.15, RG 8.25, NUREG/CR-0041, TS, and procedures required by TS as criteria for determining compliance. The inspectors reviewed the UFSAR to identify ventilation and radiation monitoring systems associated with airborne radioactivity controls and respiratory protection equipment staged for emergency use. The inspectors also reviewed respiratory protection program procedures and current performance indicators for unintended internal exposure incidents.

Self-Contained Breathing Apparatus for Emergency Use

The inspectors reviewed the following: the status and surveillance records for three SCBAs staged in-plant for use during emergencies, PSEG's SCBA procedures, maintenance and test records, the refilling and transporting of SCBA air bottles, SCBA mask size availability, and the qualifications of personnel performing service and repair of this equipment.

Problem Identification and Resolution

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

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05 - 2 samples)

a. Inspection Scope

The inspectors reviewed performance in assuring the accuracy and operability of radiation monitoring instruments used to protect occupational workers during plant operations and from postulated accidents. The inspectors used the requirements in 10 CFR Part 20, RGs, ANSI 323A, N323D, and N42.14, and procedures required by TSs as criteria for determining compliance. The inspectors reviewed Hope Creek's UFSAR, Radiation Protection audits, records of in-service survey instrumentation, and procedures for instrument source checks and calibrations.

Walkdowns and Observations

The inspectors conducted walkdowns of plant area radiation monitors and continuous air monitors. The inspectors assessed material condition of these instruments and that the

monitor configurations aligned with the UFSAR. The inspectors checked the calibration and source check status of various portable radiation survey instruments and contamination detection monitors for personnel and equipment.

Calibration and Testing Program

For the following radiation detection instrumentation, the inspectors reviewed the current detector and electronic channel calibration, functional testing results alarm set-points and the use of scaling factors: laboratory analytical instruments, whole body counter, containment high-range monitors, portal monitors, personnel contamination monitors, small article monitors, portable survey instruments, area radiation monitors, electronic dosimetry, air samplers and continuous air monitors. The inspectors reviewed the calibration standards used for portable instrument calibrations and response checks to verify that instruments were calibrated by a facility that used National Institute of Science and Technology traceable sources.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

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

b. Findings

No findings were identified.

.2 Annual Sample: Review of Multiple Emergency Diesel Generator Speed Switch Failures

a. Inspection Scope

The inspectors reviewed PSEG's identification, evaluation, and CAs associated with three EDG SS failures that have occurred beginning on August 4, 2015. The inspectors assessed PSEG’s problem identification threshold, technical and cause analyses, operating experience (OE) and trend reviews, vendor oversight, and the prioritization and timeliness of CAs to evaluate whether PSEG was appropriately identifying,

characterizing, and correcting problems associated with these issues and whether the planned and/or completed CAs were appropriate. The inspectors compared the actions taken in accordance with the requirements of PSEG's procurement and maintenance procedures, PSEG's CAP, 10 CFR Part 50, Appendix B, HCGS TSs, and the MR.

b. Observations

Hope Creek has experienced three failures of their EDG SSs ('C' EDG on August 4, 2015, and again on August 4, 2016; and 'A' EDG on February 3, 2017). Hope Creek utilizes four EDGs to serve as the standby electrical power source to the safety-related emergency 4.16 kV buses. The control circuit of each EDG contains an electronic SS assembly. The assembly includes a Dynalco Controls SS board, and an external Fairbanks Morse (FM) voltage regulator. The external voltage regulator steps down control power and outputs to input terminals on the SS board. On the SS board, an internal voltage regulator accepts the stepped down power through a protection circuit containing a series of resistors and a Zener diode (CR17) prior to providing power to the rest of the SS board components. The analog and digital output of the SS assembly is checked, and if necessary, calibrated by PSEG on a 24 month frequency.

The inspectors reviewed previous NRC IRs, including:

1. NRC IR 05000354/2016001; Section 4OA2.4, which documented an adverse trend of 'C' EDG equipment failures. This review included PSEG's apparent cause evaluation (ACE) 70179133 for the August 4, 2015, failure of the 'C' EDG SS, which, at the time, PSEG had determined failed due to a manufacturing defect.

2. NRC IR 05000354/2016002; Section 4OA2.2 documented an adverse trend in EDG SS performance. PSEG closed this issue to pending CAs in ACE 70188603 for the August 4, 2016, SS failure, which included actions to replace the SSs with new style.

3. NRC IR 05000354/2017008; Section 4OA2.1.b(3), EDG Speed Switch Failures, which documented observations concerning: a) PSEG's improper CAP tracking of the two 'C' EDG SS failure analyses; and, b) PSEG not re-evaluating their causal evaluation and associated CAs once the FAs were completed.

The inspectors reviewed PSEG's 2016 ACE 70188603 which documented, in part, that the design configuration for the EDG SSs was incorrect. Specifically, the design of the external voltage regulator was determined to be rudimentary and susceptible to noise, which could induce SS board failures. The inspectors also reviewed PSEG's Problem Identification and Resolution Focused Area Self-Assessment (FASA), 80117891, completed on October 14, 2016, which conducted an in-depth review of the EDG system. In the FASA, PSEG documented that the EDG SS failures were reoccurring, and that the cause was determined to be SS design and workmanship issues. The FASA concluded that the site's CAs were appropriate, and noted that one of the current open CAs was to perform periodic monitoring of SS voltage and current draw to determine why the CR17 Zener diode keeps failing. The inspectors found that no formal periodic monitoring had been put into place, but PSEG performed a one-time voltage test during the October 2016 refueling outage, and then once more after the third SS failure on February 3, 2017.

The inspectors reviewed NOTF 20748785 for erroneous speed indication on the 'A' EDG during its monthly ST on January 3, 2017. PSEG completed the ST, and then developed a Fix It Now (FIN) team WO (60133121) per PSEG procedure MA-AA-716-234, "FIN Team," for corrective maintenance replacement of the SS to address the speed indication issue under their simple troubleshooting process. The NOTF documented that the SS was not calibrated in-place but was removed from the 'A' EDG, calibrated on the bench revealing a potential issue with the output current, and sent off for FA under Order 70192076. The replacement SS was calibrated on the bench satisfactorily, installed in the 'A' EDG and verified to be operating correctly through performance of an EDG maintenance.

However, the inspectors identified one finding during this review which is discussed below.

c. Findings

Introduction. A self-revealing Green NCV of 10 CFR Part 50, Appendix B, Criterion VIII, "Identification and Control of Materials, Parts and Components," was identified because PSEG did not have adequate control measures to prevent the use of defective parts. Specifically, following the 'C' EDG SS failure on August 4, 2016, PSEG's control measures did not prevent the installation of a previously failed SS, susceptible degradation due to the component's previous failure history, known manufacturing and design deficiencies, and damage sustained during the receipt inspection process, into the 'A' EDG on January 6, 2017. Subsequently, less than one month later on February 3, 2017, the 'A' EDG failed to start due to a failed SS.

Description. On February 3, 2017, the 'A' EDG failed to start due to a failed SS. PSEG replaced the failed SST2400A-1 (A-1) model SS, with an SST2400A-8 (A-8) model SS, and retested the 'A' EDG satisfactorily. PSEG's causal evaluation (ERE 70192076) and FA determined that the SS, specifically the internal voltage regulating circuit Zener diode (CR17) and adjustable voltage regulator chip (LM317), had failed. The FA postulated that the LM317 was operating marginally, causing it to overheat and fail when energized, resulting in the CR17 and overall SS failure.

The inspectors noted the recent 'C' EDG SS failures that occurred on August 4, 2015, and August 4, 2016, and inspected the history of the 'A' EDG A-1 model SS that failed on February 3, 2017. The inspectors learned that this SS had been originally installed (new) on the 'D' EDG in 2013. It was then removed and installed on the 'C' EDG on July 5, 2016, failing less than one month later on August 4, 2016. Between August 4, and November 1, 2016, this SS was sent out for FA, refurbished by the vendor, damaged (dropped) during PSEG's receipt inspection, repaired and inspected/tested again by the vendor, and sent back to PSEG for reuse as a spare. The SS was then installed in the 'A' EDG on January 6, 2017, following erroneous speed indications on the 'A' EDG during monthly surveillance testing, and in less than one month failed in the 'A' EDG on February 3, 2017.

The inspectors reviewed PSEG's ERE 70188603 for the 'C' EDG SS failure that occurred on August 4, 2016, which documented that the A-1 model SSs were the vendor recommended model in 2013, but shortly thereafter and now exclusively, the vendor recommended using the A-8 model. This recommended change to model A-8 was due to industry feedback concerning other failures involving the margin between the output of

the regulating base and the acceptable voltage range of the CR17 in the A-1 model SS. The evaluation concluded that the A-1 model SSs needed to be replaced because, with minimal operating margin between the SS voltage regulator base and the CR17, there was greater opportunity for component degradation. PSEG's recommended CAs after the August 4, 2016, failure included completing an equivalency change (Order 80119127) to replace the installed A-1 and A-8 model SSs with a newer design (A-416). PSEG extended the due date for installation of these new SSs from January 13, to March 31, 2017, because of delays in obtaining the A-416s from the vendor. As an interim corrective action until the newer model SSs could be installed, PSEG created a PM activity to periodically test the power supply input and current draw on the installed SSs to monitor them for potential degradation. This CA was scheduled to start on November 30, 2016, but was not implemented until March 20, 2017.

Following the February 3, 2017, SS failure, the inspectors reviewed PSEG's decision to replace the 'A' EDG SS on January 6, 2017, with an A-1 model SS susceptible degradation due to the component's previous failure history, known manufacturing and design deficiencies, and damage sustained during the receipt inspection process when a currently vendor recommended A-8 model had been available in PSEG's spare SS inventory. PSEG's causal evaluation found that the spare A-8 model SS had been incorrectly tagged as defective prior to January 2017.

The inspectors reviewed the previous FAs performed on the two 'C' EDG SS failures. Each of these FAs showed visually identical failures of the CR17 and heat damage to the SS board. The inspectors summarized the FAs below:

- PSE-07769, the August 4, 2015, 'C' EDG SS FA, dated September 14, 2015, showed clear evidence of the failed (overheated) Zener diode (CR17), and damage to the opposite side of the circuit board voltage regulating chip (LM317). The FA determined the most likely cause of the CR17 failure was the LM317, and refurbishment/repair was not recommended by the vendor.

- PSE-79368, the August 4, 2016, 'C' EDG SS FA dated September 16, 2016, showed the failed (overheated) CR17. The inspectors noted that there was no discussion on the condition of the LM317. The FA determined the most likely cause of the CR17 failure was due to questionable CR17 quality combined with minimal operating margin between the CR17 and the SS external voltage regulator. PSEG expedited the refurbishment of the SS by replacing only the failed CR17 because they needed a spare for inventory/contingency.

- PSE-10539, the February 3, 2017, 'A' EDG SS FA dated March 28, 2017, showed the failed (overheated) CR17. The FA determined that failed CR17 was identical to the previous SS failure on August 4, 2016, and that the SS board was damaged due to the overheated CR17. The FA also determined that the LM317 had failed, and postulated that when the CR17 overheated during the previous failure on August 4, 2016, the LM317 was damaged due to its proximity to the CR17. The FA also stated that the damage to the LM317 went unrecognized during the FA and refurbishment process, and caused the LM317 to operate at a higher temperature, which caused the newly replaced CR17 to fail again.

Based on the information above, the inspectors determined that PSEG did not prevent the installation of the previously failed SS in the 'A' EDG on January 6, 2017,

susceptible to degradation due to the component's previous failure history, known manufacturing and design deficiencies, and damage sustained during the receipt inspection process. Subsequently, less than one month later on February 3, 2017, the 'A' EDG failed to start due to the failure of the SS. PSEG's CAs included replacing the SS, identifying an equivalent replacement for the currently installed SS design, scheduling the replacement of the new SSs, and performing extent of condition inspections and testing of all the installed and spare EDG SSs to determine if the CR17 or LM317 components are degraded. PSEG is also currently assessing the past operability of this condition on the 'A' EDG as part of NOTF 20759444 (initiated on March 22, 2017.

Analysis. Not having adequate control measures to prevent the use of defective parts was a performance deficiency that was within PSEG's ability to foresee and correct and should have been prevented. The inspectors determined that the finding was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, PSEG not preventing the re-installation of the previously failed SS, susceptible to degradation due to the component's previous failure history, known manufacturing and design deficiencies, and damage sustained during the receipt inspection process, into the 'A' EDG on January 6, 2017, led to the 'A' EDG failing to start on February 3, 2017. In accordance with IMC 0609.04, "Initial Characterization of Findings," dated October 7, 2016, and Exhibit 2 of IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012, the inspectors determined that this finding is of very low safety significance (Green) because the performance deficiency was not a design or qualification deficiency, did not involve an actual loss of safety function, did not represent the actual loss of a safety function of a single train for greater than its TS allowed outage time, did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety-significant in PSEG's MRP for greater than 24 hours. Specifically, the EDG was restored to operable status in approximately 18 hours.

This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because PSEG did not thoroughly evaluate issues to ensure that resolutions address causes and extent of conditions commensurate with their safety significance. Specifically, PSEG did not thoroughly evaluate their previous FAs performed on the failed SSs. This contributed to PSEG's inadequate level of refurbishment of the failed SS from August 4, 2016. [P.2]

Enforcement. 10 CFR Part 50, Appendix B, Criterion VIII, "Identification and Control of Materials, Parts and Components," requires, in part, that measures shall be established for the identification and control of materials, parts, and components, and that these identification and control measures shall be designed to prevent the use of incorrect or defective material, parts, and components. Contrary to the above, between August 4, 2016, and February 3, 2017, PSEG did not have adequate control measures to prevent the reuse of defective parts. Specifically, following the 'C' EDG SS failure on August 4, 2016, PSEG's control measures did not prevent the installation of this previously failed SS, susceptible to degradation due to the component's previous failure history, known manufacturing and design deficiencies, and damage sustained during the receipt inspection process, into the 'A' EDG on January 6, 2017. Consequently, less than one month later on February 3, 2017, the 'A' EDG failed to start due to a failed SS. PSEG's

CAs included replacing the SS, identifying an equivalent replacement for the currently installed SS design, scheduling the replacement of the new SSs, and performing extent of condition inspections and testing of all the installed and spare EDG SSs to determine if the CR17 or LM317 components are degraded. Because this violation was of very low safety significance (Green), and PSEG has entered this performance deficiency into the CAP as NOTF 20754048, the NRC is treating this as an NCV in accordance with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000354/2017001-01; Inadequate Control of Defective Material Causes the 'A' EDG to Fail to Start)**

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

.1 (Closed) Licensee Event Report (LER) 05000354/2016-001-00: High Pressure Coolant Injection (HPCI) System Found to be Inoperable during Testing

In Section 4OA2.2 of NRC IR 2016003, the inspectors identified a Severity Level IV NCV of 10 CFR 50.73(a)(2)(v) for not submitting an LER within 60 days of an event or condition that could have prevented the fulfillment of a safety function at any time within 3 years of the date of discovery. Specifically, on April 7, 2016, while performing an IST of the HPCI system, the turbine tripped on overspeed shortly after startup due to low spring force on the overspeed trip tappet assembly reset spring. This condition allowed the overspeed tappet to trip the turbine without an actual overspeed condition present, rendering the HPCI system inoperable and unable to automatically initiate and inject at rated flow within 35 seconds as required per TSs, and which could have prevented the fulfillment of a safety function.

PSEG's CAs for this event included submitting LER 05000354/2016-001-00 under 10 CFR 50.73(a)(2)(v)(D) on October 4, 2016, entering the issue into their CAP under NOTF 20741046, resetting the reset spring to within the proper pre-load band, replacing the reset spring on October 29, 2016, and completing a causal evaluation (ACE 70192131) on March 27, 2017. The inspectors reviewed the event, PSEG's CAs and their ACE, identifying one finding that is discussed below. This LER is closed.

Introduction. A self-revealing Green NCV of TS 6.8.1, "Procedures," was identified because PSEG did not establish an appropriate PM schedule for the HPCI overspeed trip system reset spring. Specifically, PSEG's PM frequency and scope for the HPCI turbine major inspection and overhaul PM was inadequate. As a result, the HPCI overspeed tappet reset spring was not replaced for 8.5 years, resulting in the reset spring force falling below the required force range. Subsequently, on April 7, 2016, the HPCI turbine tripped and then reset shortly after being started because of the low reset spring force, making the HPCI system unable to automatically initiate and inject at rated flow within 35 seconds as required per TSs and the design basis.

Description. On April 7, 2016, the HPCI system was placed in service for a retest following system maintenance (a planned 36 month removal, clean and inspection of the HPCI governor tubing for wear, water and particulate contamination). Shortly after the HPCI turbine was started, operators received a HPCI turbine trip alarm, where the turbine was noted to trip and then reset over the course of approximately 45 seconds. The HPCI turbine governor was then able to recover and bring the turbine back up to rated speed. PSEG's troubleshooting determined the as-found reset spring force to be 1.0 pound-force (lbf), which was outside the required range of PSEG's HPCI turbine overhaul procedure, HC.MD-PM.FD-0001 (2.0 to 5.0 lbf). PSEG determined that

a low reset spring force would allow the HPCI overspeed trip tappet assembly to float upward on a system start-up, tripping the turbine when no actual overspeed condition existed. PSEG's immediate CAs were to reset the spring force to the required range, retest and declare the HPCI system operable.

PSEG's ACE was completed on March 27, 2017, approximately 1 year after the event due to a number of inspector identified performance deficiencies associated with PSEG's inadequate evaluation of the event (See NRC IRs 2016003 and 2017008). PSEG's ACE determined that the most likely cause of the low spring force was due to the effects of age and environmental conditions. Specifically, the ACE determined that the spring had been installed for a period of 8.5 years and that there was no existing PM that specifically included replacement of the reset spring.

The ACE documented that the EPRI Manual, "Terry Turbine Maintenance Guide for HPCI Application," recommended replacing the reset spring during the site's major HPCI turbine inspection and overhaul PM. As part of PSEG's CAs, PSEG added the replacement of the reset spring to their existing 12 year HPCI turbine inspection and overhaul PM (Maintenance Plan HC216171). In addition to the reset spring's age, PSEG's metallurgical and chemical FAs of the reset spring found incipient corrosion fatigue and material porosity resulting, in part, from increased HPCI room temperatures and humidity caused by known steam admission valve leakage. The ACE included a CA to replace the reset spring during the 6.87 year EQ overspeed trip mechanism PM (MP HC240233).

The inspectors reviewed PSEG's ACE, HPCI PM MPs, industry OE, vendor manuals, the EPRI Manual, and the HPCI Performance Centered Maintenance (PCM) template. The inspectors reviewed the frequency and scope for the major HPCI inspection and overhaul recommended in these documents, and found that:

- The EPRI manual, Section 4.4, Major Inspections and Planned Maintenance, recommends conducting a major HPCI turbine inspection and overhaul at an interval of every four to five refueling outages (a typical time period of 6 to 10 years, unless operating history dictates the need for more frequent inspections), specifically citing areas of concern which include the turbine overspeed trip assembly by replacing the overspeed trip tappet and tappet reset spring as consumable items. The inspectors determined that based on Hope Creek's 1.5 year refueling outage cycle, the major HPCI turbine inspection and overhaul should be performed every 6 to 7.5 years, not every 12 years.

- The current HPCI PCM template for Terry (Style) Turbines BWR & Pressurized Water Reactor (PWR), which was revised in 2014, recommends an 8 year frequency stating that this task is focused on, in part, overhauling the overspeed trip mechanism and that underlying failure data does not permit the task interval to be longer than 10 years. Prior revisions of the template, from the template's inception in 2005, recommended a 10 year frequency.

- PSEG conducted a review of the template in 2005, and documented in CAP in Order 80081773-0030 that HC216171 (for all HPCI components) should be 8 year frequency, not 10 years. The inspectors reviewed this and found PSEG did not correct this issue.

- Around 2009, PSEG changed the frequency from 10 to 12 years because the NEIL (plant liability insurance) frequency changed to 12 years. The inspectors reviewed the justification for this PM frequency change, documented in Orders 70083138-0010 and 70080151-0090, determining that PSEG's justification for the change was inadequate in that it only included the NEIL frequency recommendation.

- PSEG's ACE notes that the industry HPCI subject matter expert recommended replacing the reset spring any time the reset mechanism is breached for a normal PM inspection or overhaul, which would be during Hope Creek's 6.87 year HPCI overspeed trip tappet assembly EQ PM.

- PSEG's reset spring component history reveals that the spring had been replaced by different WOs approximately every 4 years starting in 1999 ('99, '03, '07) until the most recent 8.5 year period prior to the low spring force being found on April 7, 2016.

Based on the information above, the inspectors determined that PSEG's HPCI major inspection PM frequency and scope justification was not adequate. PSEG's immediate CAs included replacing the reset spring, adding replacement of the spring to the 6.87 year HPCI EQ PM and evaluating the storage requirements for springs in inventory.

Analysis. The inspectors determined that PSEG not establishing an appropriate PM schedule for the HPCI overspeed trip system reset spring, specifically, the PM frequency and scope justification for their major inspection and overhaul for the HPCI turbine was a performance deficiency that was within PSEG's ability to foresee and correct, and should have been prevented. This 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 inadequate PM frequency and scope for the reset spring resulted in the low spring force due to the spring's age allowing the trip tappet assembly to float upward on a HPCI system start-up, tripping the turbine when no actual overspeed condition existed. In accordance with IMC 0609.04, "Initial Characterization of Findings," dated October 7, 2016, and Exhibit 2 of IMC 0609, Appendix A, "The SDP for Findings At-Power," dated June 19, 2012, the inspectors determined that this finding is of very low safety significance (Green) because the performance deficiency was not a design or qualification deficiency, and did not involve an actual loss of safety function, did not represent the actual loss of a safety function of a single train for greater than its TS allowed outage time, did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety-significant in PSEG's MRP for greater than 24 hours. Specifically, following the overspeed trip on April 7, 2016, HPCI was restored to operable status in approximately 36 hours.

The inspectors determined there was no cross-cutting aspect associated with this finding since it was not representative of current PSEG performance. Specifically, PSEG's inadequate PM schedule for the HPCI overspeed trip tappet assembly reset spring involved multiple missed opportunities to re-evaluate the PM's scope and frequency from 2005 through 2009. In accordance with IMC 0612, the causal factors associated with this finding occurred outside the nominal three-year period of consideration and were not considered representative of present performance.

Enforcement. Technical Specification 6.8.1 states, in part, that written procedures recommended in Appendix A of RG 1.33, “Quality Assurance Program Requirements (Operation),” Revision 2, February 1978, shall be established, implemented, and maintained. Section 9.b, Procedures for Performing Maintenance, of Appendix A to RG 1.33 states that preventive maintenance schedules should be developed to specify, in part, the inspection of equipment and the replacement of parts. Contrary to the above, since 2005, PSEG’s PM frequency and scope justification for the HPCI overspeed trip system reset spring was inadequate. Since the HPCI overspeed tappet reset spring was not replaced for 8.5 years, the reset spring’s force was low and outside of the required force range. As a result, on April 7, 2016, the HPCI turbine tripped and then reset shortly after being started because of the low reset spring force, making the HPCI system unable to automatically initiate and inject at rated flow within 35 seconds as required per TSs and the design basis. PSEG’s immediate CAs included replacing the reset spring, adding replacement of the spring to the 6.87 year HPCI EQ PM and evaluating the storage requirements for springs in inventory. Because this finding was of very low safety significance (Green) and has been entered into PSEG’s CAP (NOTF 20754662), this violation is being treated as an NCV, consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000354/2017001-02; Inadequate Preventive Maintenance Replacement Schedule for the HPCI Overspeed Trip Tappet Reset Spring)**

.2 (Closed) LER 05000354/2016-004-00: Operations with a Potential to Drain the Reactor Vessel (OPDRV) Without Secondary Containment

On October 23, 24, and 31, 2016, during a planned refueling outage with the reactor cavity flooded up in Mode 5, Hope Creek conducted multiple OPDRVs without an operable secondary containment. The conduct of an OPDRV without establishing secondary containment integrity is a condition prohibited by TS as defined by 10 CFR 50.73(a)(2)(i)(B). Secondary containment is required by TS 3/4.6.5.1 in Operational Condition (*), which is a condition when recently irradiated fuel is being handled during an OPDRV. The required action for this specification is to suspend handling recently irradiated fuel and OPDRV operations.

In this case, the specific OPDRVs were control rod drive mechanism replacements (8:40 a.m. on October 23, 2016, through 10:50 p.m. on October 23, 2016), local power range monitor replacements (10:50 p.m. on October 23, 2016, through 8:07 a.m. on October 24, 2016), additional control rod drive mechanism and local power range monitor replacements (8:07 a.m. on October 24, 2016, through 8:23 a.m. on October 25, 2016), and the fill and vent for the ‘A’ and ‘B’ RRP seal (11:21 a.m. on October 31, 2016, through 12:02 p.m. on November 1, 2016).

The OPDRVs were completed in accordance with PSEG procedure OP-HC-108-102, "Management of Operations with the Potential to Drain the Reactor Vessel (OPDRV)," Revision 5, dated October 6, 2016. These OPDRVs were completed and exited at 12:02 p.m. on November 1, 2016.

The NRC issued EGM 11-003, Revision 3, “Enforcement Guidance Memorandum on Dispositioning Boiling Water Reactor Licensee Noncompliance with Technical Specification Containment Requirements During Operations with a Potential For Draining the Reactor Vessel,” on January 15, 2016, which provides, in part, for the exercise of enforcement discretion only if the licensee demonstrates that it has

implemented specific interim actions during any OPDRV activity. The inspectors determined that PSEG's implementation of these specific interim actions during these OPDRV activities were adequate and met the intent of EGM 11-003, Revision 3.

The inspectors' assessments of PSEG's implementation of these criteria during each of the multiple OPDRV activities are described below:

- The inspectors observed that, as required by the EGM, the OPDRV activity was logged in the control room narrative logs and that the log entry appropriately recorded the safety-related pump ('B' RHR) that was the standby source of makeup designated for the evolution.

- The inspectors noted that the reactor vessel water level was maintained at least 22 feet and 2 inches over the top of the reactor pressure vessel (RPV) flange in compliance with the minimum water level allowed by Hope Creek TS limiting condition for operation (LCO) 3.9.8 applicability.

- The inspectors also noted that at least one safety-related pump was the standby source of makeup designated in the control room narrative logs for the evolution with the capability to inject water equal to, or greater than, the maximum potential leakage rate from the RPV for a minimum time period of 4 hours.

- PSEG reported that the worst case estimated time to drain the reactor cavity to the RPV flange was 36.6 hours, which met the EGM criteria of greater than 24 hours.

- The inspectors verified that the OPDRV was not conducted in Mode 4 and that PSEG did not move recently irradiated fuel during the OPDRV.

- The inspectors noted that PSEG had in place a contingency plan for isolating the potential leakage path.

- The inspectors verified that two independent means of measuring RPV water level (one alarming) were available for identifying the onset of loss of inventory events with sufficient time to close secondary containment before reactor water level reached the top of the RPV flange.

Technical Specification 3.6.5.1 is applicable in Operational Conditions 1, 2, 3 and (*). This TS requires that secondary containment integrity shall be maintained. Operational Condition (*) is defined, in part, as being during OPDRV. TS 3.6.5.1, action b, states, in part, in operational condition (*) suspend operations with a potential for draining the reactor vessel. Contrary to the above, between 8:40 a.m. on October 23, 2016, and 12:02 p.m. on November 1, 2016, Hope Creek Generating Station did not maintain secondary containment integrity while conducting OPDRV activities. Because the violation was identified during the discretion period described in EGM 11-003 Revision 3, the NRC is exercising enforcement discretion in accordance with NRC Enforcement Policy Section 2.2.4, "Exceptions to Using Only the Operating Reactor Assessment Program," and Section 3.5, "Violations Involving Special Circumstances," and, therefore, will not issue enforcement action for this violation.

In accordance with EGM 11-003 Revision 3, each licensee that receives discretion must submit a license amendment request within 4 months of the NRC staff's publication in the Federal Register of the notice of availability for a generic change to the STS to provide more clarity to the term OPDRV. The inspectors observed that PSEG is tracking the need to submit a license amendment request in its CAP as NOTF 20559547 (Order 70138857). No findings were identified. This LER is closed.

.3 (Closed) LER 05000354/2016-005-00 and -01: Reactor Protection System Actuation while the Reactor was Shutdown

On November 5, 2016, a RPS actuation occurred during a valid scram discharge volume high water level signal, causing the 'B' reactor recirculation pump to trip and the scram air header to depressurize. The reactor was in cold shutdown at the time of the RPS actuation, with all control rods inserted and shutdown cooling was removed from service to support planned excess flow check valve testing. PSEG determined that the RPS actuation was the result of a Redundant Reactivity Control System (RRCS) Alternate Rod Insertion (ARI) signal that was inadvertently generated during planned testing. PSEG reported this as a condition reportable under 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in a manual or automatic actuation of RPS. PSEG concluded that the apparent causes for this inadvertent signal were inadequate testing procedures, specifically, unc lear direction for the performance of required steps during excess flow check valve testing and incorrect logic used for disabling system trips for RRCS. PSEG entered the issue into their CAP as NOTF 20746413, and CAs included revising the multiple testing procedures involved and conducting training with all operators on the event and the use of the procedures. The inspectors determined that: 1) all plant systems responded as designed; 2) the RPS actuation did not cause any required system to become inoperable or any design limits to be exceeded; and, 3) there were no adverse safety consequences as a result of this event. While the inspectors determined that PSEG's inadequate procedures was a performance deficiency, the issue was determined not to be more than minor because there was no actual safety consequence and the mitigating systems cornerstone was not adversely affected as result of this event. This LER is closed.

.4 (Closed) LER 05000354/2016-006-00 and -01: Mode Change without 'B' Channel Level Instrumentation Operable

On November 9, 2016, with the Hope Creek reactor in operational condition 2 (OPCON 2), startup, the 'B' channel reactor level instrumentation was found to be inoperable. The inoperable instrumentation was discovered as reactor water level was being lowered into the normal band in preparation for reactor startup. The 'B' channel reactor level instrumentation is required to be operable in order to enter OPCON 2 to support the 'B' division of RPS, the ECCS, and the primary containment isolation system. PSEG determined the cause to be an improperly filled reference leg for the 'B' channel reactor level instrumentation. PSEG reported this as a condition reportable under 10 CFR 50.73(a)(2)(i)(B) as a condition which was prohibited by TSs. PSEG entered the issue into their CAP as NOTF 20749938, and CAs included securing the reactor startup, conducting system troubleshooting/restoration prior to recommencing the reactor startup, performing an extent of condition on all DCPs completed during the refueling outage, and revising their preventive maintenance procedures to ensure that the instrument racks are properly backfilled on a frequent reoccurring basis and following any instrument rack maintenance. The inspectors reviewed this event, PSEG's

completed causal evaluation completed under Order 70190770, and NRC Inspection Report 2016004, which documented a Green self-revealing NCV of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," and TS 3.0.4 for PSEG inadequately implemented their configuration change control procedure, CC-AA-103, and a design change package (DCP 80108179) for rerouting a 'B' channel instrument line (LT-N085B) by not fully restoring the system upon completion of the DCP on November 3, 2016. As a consequence, multiple MCR indicators became inoperable without PSEG identifying the problem until operators transitioned the reactor plant to startup, OPCON 2 or Mode 2, on November 9, 2016. This constituted a violation of TS 3.0.4 because PSEG transitioned to OPCON 2 while multiple LCOs were not met. The inspectors did not identify any additional performance deficiencies associated with this event. This LER is closed.

4OA5 Other Activities

.1 Operation of an Independent Spent Fuel Storage Installation at Operating Plants (60855, 60855.1)

a. Inspection Scope

On March 6, 2017, the inspectors were onsite to observe PSEG's loading of a multi-purpose canister (MPC) – 484, the second of six canisters to be loaded during the licensee's Independent Spent Fuel Storage Installation (ISFSI) dry cask campaign. The inspectors reviewed documentation related to PSEG's planned activities for the loading of a MPC. However, due to equipment and scheduling issues, PSEG's loading campaign was rescheduled to June 2017. As of March 23, 2017, the loading campaign was cancelled for the year and the casks planned for this campaign will be added to the next campaign planned for 2020. The inspectors reviewed NOTF 20756568, WO 60133849, and interviewed plant personnel to ensure PSEG was taking appropriate corrective action for the equipment issues.

b. Findings

No findings were identified.

.2 Temporary Instruction 2515/192, "Inspection of the Licensee's Interim Compensatory Measures Associated with the Open Phase Condition Design Vulnerabilities in Electric Power Systems."

a. Inspection Scope

The objective of this performance based temporary instruction (TI) is to verify implementation of interim compensatory measures associated with an open phase condition (OPC) design vulnerability in electric power system for operating reactors. The inspectors conducted an inspection to determine if PSEG had implemented the following interim compensatory measures. These compensatory measures are to remain in place until permanent automatic detection and protection schemes are installed and declared operable for OPC design vulnerability. The inspectors verified the following:

- PSEG had identified and discussed with plant staff the lessons-learned from the OPC events at the US operating plants including the Byron station OPC event and its

consequences. This includes conducting operator training for promptly diagnosing, recognizing consequences, and responding to an OPC event.

- PSEG had updated plant operating procedures to help operators promptly diagnose and respond to OPC events on off-site power sources credited for safe shutdown of the plant.

- PSEG had established and continue to implement periodic walkdown activities to inspect switchyard equipment such as insulators, disconnect switches, and transmission line and transformer connections associated with the offsite power circuits to detect a visible OPC.

- PSEG had ensured that routine maintenance and testing activities on switchyard components have been implemented and maintained. As part of the maintenance and testing activities, PSEG assessed and managed plant risk in accordance with 10 CFR 50.65(a)(4) requirements.

b. Findings and Observations

No findings were identified. The inspectors verified the TI or above criteria were met.

4OA6 Meetings, Including Exit

On April 13, 2017, the inspectors presented the inspection results to Mr. Edward Casulli, HCGS Plant Manager, and other members of the PSEG staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report. PSEG management acknowledged and did not dispute the findings.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel
E. Carr, Site Vice President
E. Casulli, Plant Manager
C. Barnes, Used Fuel Loading Project Manager
S. Bier, Operations Shift Manager
J. Boyer, Mechanical/Structural Design Manager, Design Engineering
L. Clark, Nuclear Technical Supervisor
B. Doody, Principal Engineer, Corporate IST
A. Hak, System Engineer
K. Hutko, Senior, Hope Creek Program Engineering
W. Kopchick, Site Engineering Director
M. Loewenstein, Design Engineer
S. Madden, Manager, Design Engineering
A. Ochoa, Regulatory Assurance Senior Compliance Engineer
S. Poinsett, Q-Technician
L. Powell, Technical Analyst, Design Engineering
J. Thompson, Procurement Engineer
H. Trimble, Radiation Protection Manager

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Open and Closed		
05000354/2017001-01	NCV	Inadequate Control of Defective Material Causes the 'A' EDG to Fail to Start (Section 4OA2.2)
05000354/2017001-02	NCV	Inadequate Preventive Maintenance Replacement Schedule for the HPCI Overspeed Trip Tappet Reset Spring) (Section 4OA3.1)
Closed		
05000354/2016-001-00	LER	High Pressure Coolant Injection (HPCI) System Found to be Inoperable during Testing (Section 4OA3.1)
05000354/2016-004-00	LER	Operations with a Potential to Drain the Reactor Vessel (OPDRV) Without Secondary Containment (Section 4OA3.2)
05000354/2016-005-00 and-01	LER	Reactor Protection System Actuation While the Reactor was Shutdown (Section 4OA3.3)
05000354/2016-006-00 and -01	LER	Mode Change without 'B' Channel Level Instrumentation Operable (Section 4OA3.4)

LIST OF DOCUMENTS REVIEWED

* Indicates NRC-identified

Section 1R01: Adverse Weather Protection

Procedures
HC.OP-GP.ZZ-0003, Station Preparations for Winter Conditions, Revision 30
OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 14

Section 1R04: Equipment Alignment

Procedures
HC.OP-AB.BOP-0003, Turbine Hydraulic Pressure, Revision 4
HC.OP-SO.BE-001, Core Spray System Operation, Revision 15
HC.OP-SO.GK-0001, Control Area Ventilation System Operation, Revision 22
HC.OP-ST.BJ-0001, HPCI System Piping and Flow Path Verification – Monthly, Revision 19
LS-AA-120, Issue Identification and Screening Process, Revision 14
MA-AA-716-232-1004, Failure Analysis Tracking and Reporting, Revision 3

Notifications
20752046 20752234 20754366 20754811 20755420*

Drawings
M-52-1, Sheet 1, Core Spray, Revision 33
M-55-1, Sheet 1, High Pressure Coolant Injection, Revision 40
M-56-1, Sheet 1, HPCI Pump Turbine, Revision 34
M-89-1, Sheet 1, Auxiliary Building Control Area Diagram, Revision 32
M-90-1, Sheet 2, Auxiliary Building Control Area Chilled Water Systems, Revision 25

Maintenance Orders/Work Orders
60132916 60135357 70191431

Section 1R05: Fire Protection

Procedures
FP-AA-005, Fire Protection Surveillance and Periodic Test Program, Revision 2
FP-AA-011, Control of Transient Combustible Material, Revision 4
FP-AA-024, Fire Drill Performance, Revision 1
FRH-II-442, Hope Creek Pre-Fire Plan – Inert Gases Compressor Rooms, FRVS Recirculation Unit Area, Steam Vent & Equipment Area, Revision 4
FRH-II-561, Hope Creek Pre-Fire Plan – Control Equipment, HVAC, Inverter & Battery Rooms, Revision 7
FRH-II-713, Hope Creek Pre-Fire Plan – Service Water Intake Structure, Revision 4
FRH-III-123, Hope Creek Pre-Fire Plan – Turbine Building, Revision 5
FRH-III-151, Hope Creek Pre-Fire Plan – Turbine Building, Revision 4
HC.FP-PM.KC-0038, Annual and Monthly Fire Extinguisher Inspection, Revision 10

Notifications
20674128 20752046 20752234 20753424 20755411 20755420*
20755629

Maintenance Orders/Work Orders
60132916 60135357

Other Documents
Fire Drill Record, Drill Scenario # 54220550 – Hope Creek Diesel Building, dated January 11, 2017

Section 1R07: Heat Sink Performance

Procedures
CY-AB-120-400, Closed Cooling Water Chemistry, Revision 2
ER-AA-340, GL 89-13 Program Implementing Procedure, Revision 6
ER-AA-340-1001, GL 89-13 Program Implementation Instructional Guide, Revision 8
HC.OP-ST.EG-0001, SACS Flow Path Verification – Monthly, Revision 9

Maintenance Orders/Work Orders
30261342 30263528 30276424 30278486 50190435

Other Documents
NLR-N90021, Hope Creek Response to Generic Letter 89-13, dated January 26, 1990
Photos of the 'A' FPCC Heat Exchanger, dated February 29, 2016
PM071Q-0010, Instruction Manual Plate Heat Exchanger, Revision 6
SACS Chemistry Sampling Results, dated February 15, 2017

Section 1R11: Licensed Operator Requalification Program

Procedures
HC.OP-IO.ZZ-0006, Power Changes During Operation, Revision 59

Other Documents
Scenario Guide (SG)-152, Flow Unit/10D410/PCP Header Break/LOCA/10A402/EOP-105, dated February 22, 2017

Section 1R12: Maintenance Effectiveness

Procedures
CC-AA-309, Control of Design Analyses, Revision 11
ER-AA-310, Implementation of the Maintenance Rule, Revision 13
ER-AA-310-1004, Maintenance Rule – Performance Monitoring, Revision 14
ER-AA-310-1005, Maintenance Rule – Dispositioning Between (a)(1) and (a)(2), Revision 10
ER-HC-310-1009, Hope Creek Generation Station Maintenance Rule Scoping, Revision 12
HC.OP-SO.GJ-0001, A(B)K400 Control Area Chilled Water System Operation, Revision 60
HC.IC-DC.ZZ-0057, Dwyer Differential Pressure Switch Series 1600, 1800 and 1900, Revision 10
MA-AA-716-004, Conduct of Troubleshooting, Revision 14

Notifications
20734380 20750230 20750626 20751149 20755384 20755385

Drawings
M-89-1, Sheet 1, Auxiliary Building Control Area Diagram, Revision 32
PJ200Q-2918, 862 Sys Control Room Return Fan AV415, Revision 6

Maintenance Orders/Work Orders
30176319 30189995 70086220 70178568 70178987 70180791
70190875 70191008

Other Documents
SC-GK-0013, Control Room Supply and Exhaust (HVAC) Calculation, Revision 3

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures
HC.IC-GP.RL-0003, De-energizing Bailey 1E Digital Logic Cabinet/Bailey 1E Digital Logic Cabinet Power Restoration/Recovery, Revision 10
HC.OP-AB.RPV-0003, Recirculation System/Power Oscillations, Revision 30
HC.OP-IO.ZZ-0006, Power Changes During Operation, Revision 59
MA-AA-716-004, Conduct of Troubleshooting, Revision 14
OP-AA-101-112-1002, On-Line Risk Assessment, Revision 9
OP-AA-106-101-1006, Operational and Technical Decision Making Process, Revision 6
OP-AA-108-111, Adverse Condition Monitoring and Contingency Planning, Revision 12
OP-HC-108-115-1001, Operability Assessment and Equipment Control Program, Revision 33
OP-AA-108-116, Protected Equipment Program, Revision 12
WC-AA-101, On-Line Work Management Process, Revision 25

Notifications
20607645 20624623 20671728 20753841 20754254 20754772
20754821 20754823 20756557 20758102 20759465

Drawings
068-02, A EDG Fuel Oil System – Typical of all EDGS, Revision 0
096-01, Control Area Ventilation, Revision 1
E-0012-004, Single Line Meter and Relay Diagram 120V AC Instrumentation and Misc Systems, Revision 8
P-0053, Equipment Location Control and D/G Area Plan EL. 102’-0”, Revision 20

Maintenance Orders/Work Orders
30164082 50131175 60087455 60123081 60133175 70161068
70161255 70166490 70177489 70180697 70191779 70191807
70191912 70191986 70192070 80115139

Other Documents
Hope Creek Narrative Log for Night Shift on February 13, 2017
HCGS PRA Risk Evaluation Form for Work Week 1707, February 12 to 18, 2017

Section 1R15: Operability Determinations and Functionality Assessments

Procedures

ER-AA-2008, MSPI Failure Determination and Evaluation, Revision 8
ER-AA-310-1005, Maintenance Rule – Dispositioning Between (a)(1) and (a)(2), Revision 10
HC.IC-CC.SE-0022, Nuclear Instrumentation System – Nondivisional Channel LPRM B LPRM Group B, Revision 17
HC.OP-FT.AC-0005, Turbine Overspeed Protection System Operability Test – Quarterly, Revision 13
HC.OP-IO.ZZ-0006, Power Changes During Operation, Revision 59
HC.OP-SO.BC-0001, Residual Heat Removal System Operation, Revision 54
HC.OP-ST.AC-0002, Turbine Valve Testing – Quarterly, Revision 50
HC.OP-ST.BC-0009, Residual Heat Removal System RHR Heat Exchanger Flow Measurement – 18 Month, Revision 16
HC.OP-ST.SV-0003, Remote Shutdown Control Operability RSP Transfer with 'B' Shutdown Cooling in Service, Revision 11
HC.RE-ST.ZZ-0001, Core Thermal Limits Surveillance, Revision 24
NF-AA-100-1600, Reload Risk Management Instructions, Revision 1
NF-AA-440, BWR Fuel Conditioning, Revision 11
NF-AA-803, GNF Fuel Operating Guidelines GNF-0142-5151, Revisions 0 and 1
OP-AA-108-115, Operability Determinations & Functionality Assessments, Revision 4
OP-AB-300-1003, BWR Reactivity Maneuver Guidance, Revision 12

Notifications

20626479	20689089	20698043	20738529	20742337	20744641
20745197	20745416	20745720	20747296	20755383	20756462
20756636	20757793				

Maintenance Orders/Work Orders

30250327	30274637	30291252	30304489	50189159	60068817
60127691	60131546	60132154	60133820	70068108	70167855
70182267	70188669	70189545	70190091	70192567	70192748

Other Documents

HC OTDM HC-17-003, #4 Turbine Stop Valve RPS Trip Delay
HCG.5-0246, Hope Creek Cycle 21 Risk Assessment dated April 12, 2016
Hope Creek COLR, Reload 19, Cycle 20, Revision 12
Hope Creek COLR, Reload 20, Cycle 21, Revision 13
Hope Creek Operations Narrative Logs dated February 15 and 27, 2017
REMA 2017-0013, February 2017 TVT and Steam Leak Repair, Revision 0
TE-000023294, H1EC-1A-P-211 ('A' Fuel Pool Cooling Pump) Oil Analysis dated August 25, 2016

Section 1R17: Evaluations of Changes, Tests, or Experiments

Procedures
CC-AA-11, Nonconforming Materials, Parts, or Components, Revision 5
CC-AA-103, Configuration Change Control for Permanent Physical Plant Changes, Revision 16
CC-AA-112, Temporary Configuration Changes, Revision 14
CC-AA-201, Plant Barrier Control Program, Revision 6
HC.MD-CM.BJ-0001, High Pressure Coolant Injection Main Pump Overhaul, Revision 9
HC.MD-CM.BJ-0002, High Pressure Coolant Injection Booster Pump Overhaul, Revision 13
HC.MD-PM.BJ-0003, High Pressure Coolant Injection Gear Reducer Overhaul, Revision 5
LS-AA-104, 50.59 Review Process, Revision 6
LS-AA-104-1000, 50.59 Resource Manual, Revision 8
LS-AA-115, Operating Experience Program, Revision 14
MA-AA-796-024, Scaffold Installation, Inspection and Removal, Revision 17
OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Revision 14
OP-HC-103-102-1005, High Energy and Internal Flooding Barrier Control Program, Revision 2
OP-HC-108-115-1001, Operability Assessment and Equipment Control Program, Revision 34
SM-AA-300, Procurement Engineering Support Activities, Revision 7
SM-AA-300-1001, Procurement Activities and Responsibilities, Revision 12
SM-AA-4026, Procurement Document Processing, Revision 6

Notifications

20349339	20471587	20635860	20642460	20675404	20677056
20689769	20693432	20695086	20720062	20721769	20727121
20737007	20737008	20737401	20737457	20737471	20750260
20751435	20757055	20757841	20759391	20759444	20759548
20760096*	20760139*	20760406*	20761326*	20761328*	20761443*

Drawings
E-0001-0, Sheet 001, Single Line Diagram Station, Revision 24
E-0024-1, Sheet 001, Single Line Meter & Relay Diagram 480 Volt Unit Substations, Revision 35
E-0027-1, Sheet 001, 480 Volt MCC Tabulation 10B112, 10B141, & 10B122, Revision 12
E-0027-1, Sheet 003, 480 Volt MCC Tabulation 10B112, 10B141, & 10B122, Revision 16
E30-943-001, Sheet 022, Block Diagram Automatic Voltage Regulator, Revision 4
M-55-1, High Pressure Coolant Injection P & ID, Revision 40
PM018Q-0366, Sheet 003, Electical Schematic Engine Control, Revision 14
PM018Q-0561, Sheet 000, Purchased Parts Bill of Materials, Revision 12
PM018Q-0644, Sheet 001, Assembly Speed Switch, Revision 1
PM018Q-0644, Sheet 002, Assembly Speed Switch, Revision 1

10 CFR 50.59 Evaluations
HC-13-180, Replacement of the HC AVR, dated 5/16/14
HC-14-118, Replacement of the Main Steam Line Safety Relief Valves (SRVs), dated 12/4/14
HC-15-029, Implement BWROG EPG/SAG Revision 3 at Hope Creek, dated 12/2/15
HC-16-192, DCR for Final Feedwater Temperature Reduction (FFWTR) Dose Calculations and Select Mechanical Calculations, dated 10/26/16

10 CFR 50.59 Screened-out Evaluations

80119127, Replace EDG Speed Switches H1KJ -1KJSS-421A/B/C/D, dated 12/21/16
HC-14-023, A (B, C, D, E, F, G, H) Diesel Fuel Oil Transfer Pump - A(B, C, D, E, F, G, H)P401 – Inservice Test, dated 9/22/14
HC-14-085, SWIS Damper Linkage Modification, dated 9/23/14
HC-14-099, Service Water Pump H1EA Motor Hold-down Bolts Necked Down, dated 6/13/14
HC-14-122, Revise Calculation E-9(Q), Standby Class 1E Diesel Generator Sizing, dated 9/6/14
HC-15-021, Alternative to Forego Disassembly and Examination of H1AB-AB-HV-F028A to Address Missed Exam, dated 3/9/15
HC-15-041, Revise TRM 3/4.7.3 for Water Tight Doors and Setpoint for OHA A2-F5 and A2-F4, dated 3/23/15
HC-15-044, 500 kV Hope Creek-Salem Tie Line Protective Relay Replacement, dated 3/19/15
HC-15-054, H1R19 FAC Information to Stress Calculations, dated 3/23/15
HC-15-119, Minimum Wall Thickness for MSL Inlet Piping to SRV, dated 5/10/15
HC-15-200, Standby Liquid Control System Improvements, dated 10/13/15
HC-15-205, 'C' Emergency Diesel Generator Governor Control System Replacement, dated 12/11/15
HC-15-209, Replacing Fusible Link of Fire Damper H1GM-1FPGMD-996A with a Higher Setpoint, dated 10/27/15
HC-15-251, PT 21 Nonconformance for RHR Limit Switches, dated 12/17/15
HC-16-001, Stress Reevaluation of the Hope Creek Steam Dryer at 115% OLTP Conditions, dated 4/4/16
HC-16-028, Finite Element Analysis of a Portion of the RWCU System Piping, dated 2/19/16
HC-16-067, Procedure Revision, Core Spray Loop A ECCS Time Response Functional Test - 18 Months, dated 9/23/16
HC-16-184, Revise HC Technical Specification Bases 3/4.8.1, dated 10/6/16
HC-16-186, Alternative NDE Requirements for RWCU Regenerative and Non-Regenerative Heat Exchanger Piping, dated 10/11/16
HC-16-201, Calculate Min Wall for Service Water Spool Pieces and Revise Calculations, dated 10/23/16
HC-15-206, Calculate Min Wall for Service Water Spool Pieces and Revise Calculations, dated 10/23/15
HC-16-207, Revise HC Technical Specification Bases 3/4.6.1.2, dated 11/1/16
HC-16-211, H1R28 FAC Information to Stress Calculation, dated 11/7/16
HC-17-001, Off-Normal and Not Tagged Position 50.59 Applicability Review, dated 1/10/17
HC-17-013, HPCI System Piping and Flow Path Verification – Monthly, dated 2/7/17

Audits and Self-Assessments

80115264, Scaffold Compliance Focused Area Self-Assessment Report, dated 12/11/15
80116860, Scaffold Program (NOS Action) Check-In Self-Assessment Report, dated 6/24/16
80116863, Evaluations of Changes, Tests, and Experiments and Permanent Plant Modifications Focused Area Self-Assessment Report, dated 9/16/16
NOSA-HPC-14-12 (80113028), Document Control and Quality Assurance Records Audit Report, dated 12/10/14
NOSA-HPC-15-07 (80114159), Engineering Design Control Audit Report, dated 7/1/15
NOSA-HPC-16-03 (80116308), Maintenance Audit Report, dated 2/25/16
NOSA-HPC-16-12 (80118152), Document Control and Quality Assurance Records Audit Report, dated 11/2/16

Calculations

1-P-BH-201S-C, Pipe Support Design Calculation, Revision 3A
1-P-BH-201S-C003, Design Calculation for Pipe Hanger 1-PH-201S-H49 and H50, Revision 0
AB-0067, MSIV Leakage Rate Conversion for Testing - EPU, Revision 1
AF-0033, Feedwater Heater Out of Service Calculation, Revision 2
C-1832, Standby Liquid Control Discharge Piping, Revision 5
E-4.2, HC Class 1E DC Equipment & Component Voltage Study, Revision 5
H-1-CG-MDC-1795, Control Rod Drop Accident Radiological Consequences, Revision 6
H-1-GQXX-SDC-0264, Design Modification Evaluation of Service Water Intake Structure HVAC Damper Actuator, Revision 1
H-1-ZZ-MDC-1880, Post-LOCA EAB, LPZ, and CR Doses, Revision 6
H-1-ZZ-MDC-1929, Fuel Handling Accident Radiological Consequences, Revision 1
H-1-ZZ-MDC-1931, Post-LOCA Equipment Qualification Doses, Revisions 0 and 1
H-1-ZZ-MDC-4019, Hope Creek EOP Calculations, Revision 1
H-1-ZZ-MDC-4028, Reactor Building Compartmental Post-LOCA EQ Dose, Revision 0

Completed Surveillance, Performance, and Functional Tests

HC.OP-IS.BH-0003, Standby Liquid Control Pump - AP208 - Inservice Test, performed 3/8/17
HC.OP-IS.BH-0004, Standby Liquid Control Pump - BP208 - Inservice Test, performed 3/16/17
HC.OP-IS.JE-0001, A Diesel Fuel Oil Transfer Pump - AP401 - Inservice Test, performed 10/28/15
HC.OP-IS.JE-0003, C Diesel Fuel Oil Transfer Pump - CP401 - Inservice Test, performed 8/2/15
HC.OP-ST.BJ-0001, HPCI System Piping and Flow Path Verification – Monthly, performed 2/28/17

Design & Licensing Bases

DEH140084, BWR Owners' Group Emergency Procedure and Severe Accident Guidelines, Revision 3
Hope Creek Generating Station Amendment 134 to Facility Operating License, dated 10/3/01
Hope Creek Generating Station Amendment 188 to Facility Operating License, dated 3/25/11
LR-N06-0286, PSEG Letter to USNRC, Request for License Amendment Extended Power Uprate Hope Creek Generating Station, dated 9/18/06
LR-N15-0012, PSEG Letter to USNRC, Report of Changes, Tests, and Experiments, dated 1/29/15
LR-N16-0204, Core Operating Limits Report, Reload 20, Cycle 21, Revision 13
LR-N17-0004, PSEG Letter to USNRC, Report of Changes, Tests, and Experiments, dated 1/31/17
U.S. NRC Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000

Engineering Evaluations

70122148-010, H1JE-1A-P-401 IST Pump Re-Baseline Evaluation, dated 5/25/11
70162883-0100, Review Raising Fusible Link Setpoint at Fire Damper D996A, Revision 0
70165411-010, Margin Management Issues for IST Pumps, dated 12/9/14
70179584-0060, Use-As-Is Interim for PT 21 Namco Limit Switches, Revision 0
70185598, 50.59 Review for Functional Locations in Off Normal Position, Revision 0
70188603-0050, Repeat Failure of 'C' EDG Speed Switch, Revision 0
70192076-0010, 'A' EDG Speed Switch and Field Flash Failure, Revision 0
DCR 80118658, Revise HC Technical Specification Bases 3/4.8.1, Revision 0
Evaluations: 70148911 & 70177896

Miscellaneous

Certificate of Conformance, PSE&G P.O. 4500735301, Fairbanks Morse Order 40090922, dated 3/7/14
ER-HC-380-1005, Hope Creek Specific Appendix J Program Information, Revision 2
Material Master Number 1090645 - Internal Comments, Change in Part Number 11916312 from 11916260, dated 3/21/13
NEDC-31858P-A, BWROG Report for Increasing MSIV Leakage Limits and Elimination of Leakage Control Systems, August 1999 Purchase Order Number 4500735301
WCD 4390859

Non Destructive Examinations (NDE)

NDE Report VT-15-180, 1-AB-HV-FO28A-V-032-VB Visual Examination of Pressure Retaining Bolting (VT-1), dated 4/27/15
NDE Report VT-15-181, 1-AB-HV-FO28A-V-032-VB Visual Exam of Pumps and Valves (VT-3), dated 4/22/15

Normal and Special (Abnormal) Operations Procedures

HC.OP-AB.BOP-0001, Feedwater Heating, Revision 18
HC.OP-AB.MISC-0001, Acts of Nature, Revision 30
HC.OP-AB.ZZ-0001, Transient Plant Conditions, Revision 32
HC.OP-AM.TSC-0014, RCIC System Operation with Complete Loss of AC & DC Power, Revision 8
HC.OP-AM.TSC-0024, Remote Operation of SRVs with RPV Injection, Revision 8
HC.OP-EO.ZZ-0101A-FC, ATWS - RPV Control, Revision 5
HC.OP-EO.ZZ-0105-FC, Reactor Pressure Vessel Control - HPCI / RCIC Only, Revision 1
HC.OP-EO.ZZ-0106-FC, Containment Control - HPCI / RCIC Only, Revision 0
HC.OP-EO.ZZ-0206-FC, RPV Flooding, Revision 10
HC.OP-EO.ZZ-0209-FC, Rapid RPV Depressurization, Revision 0
HC.OP-EO.ZZ-0318, Containment Venting, Revision 10
HC.OP-EO.ZZ-0324, Bypassing RCIC Level 8 Trip Interlock, Revision 1
HC.OP-EO.ZZ-0325, Bypassing HPCI Level 8 Trip Interlock, Revision 2
HC.OP-IS.JE-0001, A Diesel Fuel Oil Transfer Pump - AP401 - Inservice Test, Revision 33
HC.OP-SO.AF-0001, Extraction Steam, Heater Vents and Drains System Operation, Revision 53
HC.OP-SO.BJ-0001, High Pressure Coolant Injection System Operation, Revision 48
HC.OP-SO.GQ-0001, Service Water Intake Structure Ventilation System Operation, Revision 10
HC.OP-ST.BJ-0001, HPCI System Piping and Flow Path Verification – Monthly, Revision 19

System Health Reports, System Walkdowns, & Trending

Fuel Oil System Health Report, Q4-2016
Fuel Oil Transfer Pump IST Trend Data, 3/94 – 10/15
Service Water System Health Report, Q4-2016
Standby Liquid Control Pump IST Trend Data, 8/15 – 3/17
Standby Liquid Control (SLC) System Health Report, Q4-2016

Vendor Technical Manuals & Specifications

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CC-AA-320-1002, Dynamic (Seismic) Qualification for Alternate Replacement Items and Commercial Grade Dedication Items, Revision 2

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60087455 60133121 60133121 60133175 60133175 70191779
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Section 2RS2: Occupational ALARA Planning and Controls

Procedures
RWP 17 ALARA Plan, SRV Activities and Platform DCP
RWP 19 ALARA Plan, Drywell Maintenance Activities
RWP 20 ALARA Plan, Maintenance Balance of Plant
RWP 29 ALARA Plan, Reactor water cleanup HX Elbow Repair

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

Other Documents
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Section 2RS5: Radiation Monitoring Instrumentation

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Section 4OA3: Follow-up of Events and Notices of Enforcement Discretion

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HC.MD-PM.FD-0001, HPCI Steam Turbine Inspection and P.M., Revision 29
HC.OP-AR.ZZ-0024, CRIDS Computer Points Book 5, D3624-D4288, Revision 12
HC.OP-AR.ZZ-0025, CRIDS Computer Points Book 5, D4303-D4596, Revision 10
HC.OP-DL.ZZ-0007, Log 7 Yard Operators Log, Revision 47
HC.OP-ST.BJ-0002, HPCI System Functional Test (Low Pressure) – 18 Months and HPCI System Response Time Test (High Pressure), Revision 41
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HCGS Maintenance Strategy: H1FD-10-S-211 dated March 20, 2017
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Section 4OA5: Other Activities

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HC.MD-FR.DCS-0006 (Q), Sealing, Drying, and Backfilling of a Loaded MPC, Revision 10
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Hope Creek Dry Cask Crew 2017 Qualification Matrix
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RWP 1, Routine Surveillances, Maintenance & Inspections

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SC.MD-FR.DCS-006, Sealing, Drying and Backfilling of a Loaded MPC, Revision 8

LIST OF ACRONYMS

10 CFR	Title 10 of the *Code of Federal Regulations*
ACE	apparent cause evaluation
ADAMS	Agencywide Documents Access and Management System
ALARA	as low as is reasonably achievable
ARI	alternate rod insertion
BWR	boiling water reactor
CA	corrective action
CAP	corrective action program
CFR	Code of Federal Regulation
CREF	control room emergency filtration
CS	core spray
DCP	design change package
ECCS	emergency core cooling system
EDG	emergency diesel generator
EHC	electrohydraulic control
EQ	environmental qualification
FA	failure analysis
FASA	focused area self-assessment
FIN	fix it now
FM	Fairbanks Morse
FPCC	fuel pool cooling and cleanup
HCGS	Hope Creek Generating Station
HPCI	high pressure coolant injection
HX	heat exchanger
IMC	inspection manual chapter
IR	inspection report
ISFSI	Independent Spent Fuel Storage Installation
IST	inservice test
kV	kilovolt
LAR	license amendment request
lbf	pound-force
LCO	limiting condition for operation
LER	licensee event report
LLRT	local leak rate test
LOCA	loss of coolant accident
MCC	motor control center
MPC	Multi-Purpose Canister
MR	maintenance rule
MRP	maintenance rule program
NCV	non-cited violation
NEI	Nuclear Energy Institute
NOTF	notification
NRC	Nuclear Regulatory Commission
OE	operating experience
OPC	open phase condition
OPCON	operational condition
OPDRV	operations with a potential to drain the reactor vessel
OTDM	operational technical decision making
PCM	performance centered maintenance

PM	preventive maintenance

PSEG	Public Service Enterprise Group Nuclear LLC
PWR	Pressurized Water Reactor
RCIC	reactor core isolation cooling
RG	regulatory guide
RHR	residual heat removal
RPS	reactor protection system
RPV	reactor pressure vessel
RRCS	Redundant Reactivity Control System
RRP	reactor recirculation pump
RTP	rated thermal power
RWP	radiation work permit
SCBA	self-contained breathing apparatus
SDP	significance determination process
SLC	standby liquid control
SS	speed switch
SSC	structure, system, and component
ST	surveillance test
STS	Standard Technical Specifications
SSW	station service water
TI	Temporary Instruction
TS	technical specification
TSV	turbine stop valve
UFSAR	Updated Final Safety Analysis Report
WO	work order