



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PA 19406-1415

March 16, 2009

Mr. Thomas Joyce  
President and Chief Nuclear Officer  
PSEG Nuclear LLC - N09  
P. O. Box 236  
Hancocks Bridge, NJ 08038

**SUBJECT: HOPE CREEK GENERATING STATION - NRC PROBLEM IDENTIFICATION  
AND RESOLUTION INSPECTION REPORT 05000354/2009006**

Dear Mr. Joyce:

On January 30, 2009, the United States Nuclear Regulatory Commission (NRC) completed an inspection at your Hope Creek Generating Station. The enclosed report documents the inspection results discussed on January 30, 2009, with Mr. J. Perry, Hope Creek Plant Manager and other members of your staff.

This inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems and compliance with the Commission's rules and regulations and the conditions of your license. Within these areas, the inspection involved examination of selected procedures and representative records, observations of activities, and interviews with personnel.

The inspectors concluded that Public Service Enterprise Group Nuclear, LLC (PSEG) was, in general, adequately identifying, evaluating, and resolving problems. PSEG personnel identified problems and entered them into the corrective action program at a low threshold. PSEG prioritized and evaluated issues commensurate with the safety significance of the problems and corrective actions were generally implemented in a timely manner. However, violations of NRC requirements and weaknesses were noted in each of these areas.

The report documents two NRC identified findings and one self-revealing finding of very low safety significance (Green). The findings were also determined to involve violations of NRC requirements. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest the 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, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Hope Creek Generating Station. In addition, if you disagree with the characterization of the cross-cutting aspect of any finding in

this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I and the NRC Resident Inspector at the Hope Creek Generating Station.

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

Sincerely,

***/RA/ Original Signed By:***

Raymond J. Powell, Chief  
Technical Support & Assessment Branch  
Division of Reactor Projects

Docket Nos: 50-354  
License Nos: NPF-57

Enclosure: Inspection Report 05000354/2009006  
w/Attachment: Supplemental Information

cc w/encl:

W. Levis, President and Chief Operating Officer, PSEG Power  
G. Barnes, Site Vice President  
P. Davison, Director, Nuclear Oversight  
E. Johnson, Director of Finance  
J. Perry, Plant Manager, Hope Creek  
J. Keenan, General Solicitor, PSEG  
M. Wetterhahn, Esquire, Winston and Strawn, LLP  
Consumer Advocate, Office of Consumer Advocate, Commonwealth of PA  
L. Peterson, Chief of Police and Emergency Management Coordinator  
P. Baldauf, Assistant Director, NJ Radiation Protection Programs  
P. Mulligan, Chief, NJ Bureau of Nuclear Engineering  
H. Otto, Ph.D., Administrator, DE Division of Water Resources  
N. Cohen, Coordinator Unplug Salem Campaign  
E. Zobian, Coordinator - Jersey Shore Anti Nuclear Alliance

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Raymond J. Powell, Chief  
 Technical Support & Assessment Branch  
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 w/Attachment: Supplemental Information

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C. Sanders, NRR, Backup  
 R. Ennis, PM, NRR  
 R1 Docket Room  
[ROPreports@nrc.gov](mailto:ROPreports@nrc.gov)

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**U.S. NUCLEAR REGULATORY COMMISSION**

REGION I

Docket No.: 50-354

License No.: NPF-57

Report No.: 05000354/2009006

Licensee: PSEG Nuclear LLC

Facility: Hope Creek Generating Station

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

Dates: January 12, 2009 through January 30, 2009

Team Leader: Andrew Rosebrook, Senior Project Engineer, DRP

Inspectors: Joseph Schoppy, Senior Reactor Inspector, DRS  
Amar Patel, Resident Inspector, DRP  
Heather Jones, Reactor Inspector, DRS  
George Smith, Physical Security Inspector, DRS

Approved by: Raymond J. Powell, Chief  
Technical Support & Assessment Branch  
Division of Reactor Projects

## SUMMARY OF FINDINGS

IR 05000354/2009006; 01/12/2009 - 01/30/2009; Hope Creek Generating Station; Identification and Resolution of Problems, three findings were identified in the areas of Problem Identification, Problem Evaluation, and Timely and Effective Corrective Actions.

This NRC team inspection was performed by one resident inspector and four regional inspectors. Three findings of very low safety significance (Green) were identified during this inspection and were classified as non-cited violations (NCVs). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### Identification and Resolution of Problems

The inspectors concluded that Public Service Enterprise Group Nuclear, LLC (PSEG), in general, adequately identified, evaluated, and resolved problems; however, weaknesses were noted in the three areas of the corrective action program (CAP). Specifically, PSEG personnel typically identified problems, entered them into the corrective action program at a low threshold, and prioritized issues commensurate with the safety significance. However, for one issue reviewed, PSEG repeatedly failed to write notifications for conditions adverse to quality as required by the surveillance procedure, resulting in a NRC-identified NCV. For most cases, PSEG appropriately screened issues for operability and reportability and performed causal analyses that appropriately considered extent of condition, generic issues, and previous occurrences. However, for one issue reviewed, the inspectors identified an inadequate evaluation of a Technical Specification (TS) acceptance criteria change, resulting in an NRC-identified NCV. Corrective actions taken to address the problems identified in PSEG's corrective action process were typically implemented in a timely manner. However, for one issue reviewed, PSEG did not establish appropriate corrective actions to address a condition adverse to quality, resulting in a self-revealing NCV.

The inspectors also concluded that, in general, PSEG adequately identified, reviewed, and applied relevant industry operating experience to Hope Creek Generating Station operations. In addition, based on those items selected for review by the inspectors, PSEG's audits and self-assessments were thorough and probing.

Based on the interviews the inspectors conducted over the course of the inspection, observations of plant activities, and reviews of individual corrective action program and employees concerns program issues, the inspectors did not identify any concerns that site personnel were not willing to raise safety issues nor did they identify conditions that could have had a negative impact on the site's safety conscious work environment.

#### A. NRC-Identified and Self-Revealing Findings

##### **Cornerstone: Mitigating Systems**

**Green.** A self-revealing Green NCV of 10 CFR 50, Appendix B, Criteria XVI, "Corrective Actions," was identified for PSEG's failure to implement corrective actions to address an identified condition adverse to quality which resulted in multiple trips of the 'A' Control Area Chilled Water (CACW) pump. In December 2008, the 'A' CACW pump tripped due

to loss of suction pressure due to air accumulation. The 'A' CACW pump has had historical issues with air accumulation resulting in pump trips resulting in a loss of the 'A' train of control room ventilation. In 2008, this pump tripped in February following maintenance, in July, and again in December. After each trip a significant amount of air was vented from the system. PSEG's apparent cause evaluation of the July 2008 trip appropriately identified that the trip was due to air accumulation while the system was in a standby configuration. The evaluation also identified that PSEG did not have a program to monitor for air accumulation as it did for other susceptible systems. However, effective corrective actions were not developed to address the susceptibility, the condition adverse to quality, and as a result the pump tripped again in December 2008. Subsequently, PSEG developed corrective actions which included a periodic venting of the system and proposed modifications to add additional vents to the system.

This finding is more than minor because it affects the equipment performance attribute of the Mitigating Systems Cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the 'A' train of Control Room Ventilation's reliability and availability were adversely impacted. This finding was determined to be of very low safety significance because the system was not unavailable for greater than its allowed TS outage time. The finding has a cross-cutting aspect in the area of problem identification & resolution (PI&R) and the aspect of problem evaluation (P.1.C) because PSEG did not thoroughly evaluate problems such that resolutions address causes and extent of conditions as necessary. Specifically, appropriate corrective actions were not developed to address system susceptibility to air accumulation, an identified condition adverse to quality. (Section 4OA2.1.c.1)

**Green.** The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," for PSEG's failure to ensure that emergency diesel generator (EDG) surveillance test (ST) procedures had appropriate acceptance criteria that incorporated the limits from applicable design documents. Specifically, PSEG did not provide EDG ST acceptance criteria associated with the differential pressure (D/P) across the EDG lube oil strainers which would ensure the ability of the EDGs to provide their safety function for the duration of its designed 24-hour mission time when the procedure was changed in 2002. As a result, from October 2008 to January 2009, the 'B' EDG was declared operable when, in fact, operability was indeterminate. PSEG's corrective actions included declaring the 'B' EDG inoperable, replacing the EDG lube oil strainer, revising the EDG ST procedures, and performing an extent of condition review.

The finding is more than minor because the performance deficiency is associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems (EDGs) that respond to initiating events to prevent undesirable consequences. The finding was determined to be of very low safety significance because it represented the loss of the safety function of a single train for less than the Technical Specification allowed outage time. This finding was not assigned a cross-cutting aspect because the underlying cause was not indicative of current performance. (Section 4OA2.1.c.2)

**Green.** The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for PSEG's failure to adequately implement procedure requirements related to the maintenance and operation of the emergency diesel generators (EDGs). Specifically, between February 2008 and January 2009,

operators repeatedly documented that the 'B' EDG LO strainer D/P was greater than 7 psid; however, they did not initiated a new notification (NOTF) as required by PSEG procedure HC.OP-ST-KJ-0002, "Emergency Diesel Generator 1BG400 Operability Test – Monthly." As a result, an out of specification system parameter was not re-screened for operability following a substantive change in this parameter resulting in the 'B' EDG being declared inoperable. PSEG's corrective actions included replacing the EDG lube oil strainer, revising procedures, and performing an extent of condition review.

The finding is more than minor because the performance deficiency is associated with the human performance attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems (EDGs) that respond to initiating events to prevent undesirable consequences. The finding was determined to be of very low safety significance based on a Phase 3 SDP evaluation based on a bounding case analysis considering the period of unavailability, a conservative estimate of time to failure, and operator recovery credit. The finding has a cross-cutting aspect in the area of Human Performance and the aspect of work practices, procedural compliance, in that PSEG personnel are to follow procedures [H.2.(b)]. Specifically, PSEG personnel did not follow procedure HC.OP-ST-KJ-0002, and write a NOTF each time EDG lube oil strainer D/P was greater than 7 psid. (Section 4OA2.1.c.3)

B. Licensee-Identified Violations

None

## REPORT DETAILS

### 4. OTHER ACTIVITIES (OA)

#### 4OA2 Problem Identification and Resolution (71152B)

##### .1 Assessment of the Corrective Action Program (CAP) Effectiveness

##### a. Inspection Scope

The inspectors reviewed the procedures that describe PSEG's CAP at the Hope Creek Generating Station (Hope Creek). PSEG identified problems for evaluation and resolution by initiating and processing notifications (NOTFs) using the SAP computer program. Problems were screened for operability and reportability, categorized based on significance (1 to 5) and assigned the level for the cause evaluation (A to D) based on significance and the level of uncertainty for the cause. When work was necessary to correct a problem, a work order (WO) was created using SAP and linked to the associated NOTF. As such, at Hope Creek, the work management and engineering change processes were part of the CAP and were utilized to correct identified conditions when deemed appropriate.

To assess the effectiveness of the CAP at Hope Creek, the inspectors reviewed performance in three primary areas: problem identification; prioritization and evaluation; and corrective action implementation. The inspectors compared performance in these three areas to the requirements and standards contained in 10 CFR 50, Appendix B, Criterion XVI and PSEG procedure, LS-AA-125, "Corrective Action Program Procedure" Revision 12. The scope of the inspectors' review for each of these areas at Hope Creek is described below. The NOTFs, WOs, and other documents reviewed for the inspection are listed in the Attachment.

##### Effectiveness of Problem Identification

The inspectors reviewed a sample of plan of the day (POD) meeting packages and meeting minutes for a sample of plant operations review committee (PORC), nuclear safety review board (NSRB), and maintenance rule expert panel meetings. The inspectors also attended one performance improvement committee meeting and a number of POD, management review committee (MRC), and station ownership committee (SOC) meetings. The inspectors verified that identified issues discussed at these meetings were entered into the CAP for evaluation and corrective action as appropriate.

The inspectors reviewed the condition of the top ten risk significant systems as determined by the Hope Creek Probabilistic Risk Assessment (PRA) model. These systems included the emergency diesel generators (EDGs), the service water (SW) system, the high pressure coolant injection (HPCI) system, the 480 VAC electrical distribution system, the SW and control room ventilation systems, and the residual heat removal (RHR) system. The inspectors reviewed system health reports, a sample of completed preventative and corrective maintenance work orders and completed surveillance test procedures. The inspectors also completed a field walkdown of the accessible portions of these systems. The inspectors verified that conditions adverse to quality identified through this review were entered into the CAP as appropriate.

The inspectors reviewed a random sample of security, operations, chemistry, and radiation protection logs. The inspectors verified that problems identified in these logs were entered into the CAP as appropriate.

The inspectors reviewed Hope Creek Emergency Preparedness (EP) Training Drill Evaluation Reports and verified that EP drill performance deficiencies identified were entered into the CAP as appropriate.

The inspectors reviewed the results of PSEG periodic equipment and human performance trend analyses and quarterly system health reports for risk significant systems. The inspectors verified that identified trends were entered into the CAP for further evaluation and corrective action as appropriate. The inspectors also reviewed the CAP trend code backlogs and verified the applicability of trend codes entered for a sample of CAP NOTFs.

The inspectors also verified that issues identified through internal self-assessments and audits and the operating experience (OE) program were entered into the CAP for evaluation and corrective action as appropriate.

#### Effectiveness of Prioritization and Evaluation of Issues

The inspectors reviewed the evaluation and prioritization for a sample of NOTFs issued since the last NRC problem identification and resolution inspection that was performed in July 2007. The inspectors considered risk insights from the station's risk analysis and ensured that the selected NOTFs were appropriately distributed across the seven cornerstones of safety and the emergency preparedness, engineering, maintenance, operations, physical security, and radiation safety functional areas. Inspectors' samples in this area were focused on the top ten risk significant systems, and security area, but were not limited to them.

The inspectors also observed four daily NOTF screening meetings conducted by the SOC during the onsite weeks, and reviewed the packages for a random sample of SOC meetings conducted since the last inspection. During these meetings PSEG personnel reviewed new NOTFs for prioritization and assignment. The issues and NOTFs reviewed encompassed the full range of evaluations, including root cause analyses (RCA), apparent cause evaluations (ACEs), equipment apparent cause evaluations (EACE), and common cause analyses (CCAs). NOTFs that were assigned lower levels of significance that did not include formal cause evaluations were also reviewed by the inspectors to ensure they were appropriately classified. The inspectors' review included the appropriateness of the assigned significance, the scope and depth of the causal analysis, and the timeliness of resolution. The inspectors assessed whether the evaluations identified likely causes for the issues and developed appropriate corrective actions to address the identified causes. Further, the inspectors reviewed equipment operability determinations, reportability assessments, and extent-of-condition reviews for selected problems to verify these processes adequately addressed equipment operability, reporting of issues to the NRC, and the extent of problems. The inspectors also observed three Management Review Committee (MRC) meetings during which PSEG managers reviewed completed RCAs, as well as selected ACEs and corrective action assignments.

### Effectiveness of Corrective Actions

The inspectors verified completion of corrective actions for a sample of NOTFs and WOs issued since the last NRC problem identification and resolution inspection that was performed in July 2007. The inspectors considered risk insights from the station's risk analysis and ensured that the selected corrective actions were appropriately distributed across the seven cornerstones of safety and the emergency preparedness, engineering, maintenance, operations, physical security, and radiation safety functional areas. Inspectors' samples in this area were focused on the top ten risk significant systems and security area, but were not limited to these areas. Corrective actions were verified to have been completed through documentation review and field walkdowns, when appropriate. The inspectors also reviewed a sample of corrective actions for NOTFs greater than two years old. The inspectors selected these items based on risk significance, and verified appropriate interim actions were in place and that the basis for not completing the specified corrective actions was appropriately documented and well supported.

The inspectors reviewed NOTFs for adverse trends and repetitive problems to determine whether corrective actions were effective in addressing the broader issues. The inspectors reviewed PSEG's timeliness in implementing corrective actions and effectiveness in precluding recurrence for significant conditions adverse to quality. The inspectors also reviewed a sample of NOTFs associated with selected NCVs, and licensee event reports to verify that PSEG personnel properly evaluated and resolved these issues. In addition, the corrective action review was expanded to five years to evaluate PSEG's actions related to the EDGs and support systems, the control room ventilation system, and the HPCI system.

#### b. Assessment

##### Effectiveness of Problem Identification

The inspectors determined that, in general, PSEG adequately identified discrepant conditions and initiated NOTFs where appropriate. However, the inspectors identified several examples where PSEG did not enter conditions adverse to quality into the corrective action system and did not identify and correct other minor deficiencies in a timely manner. One of these examples involved a violation of NRC requirements for failing to identify and review for operability a non-conforming condition for the 'B' EDG. This example is discussed in detail in section 4OA2.1.c.3.

During plant walkdowns, the inspectors noted several issues which had not been identified by PSEG. In some cases, these items reflected an acceptance of minor equipment deficiencies or less than adequate implementation of program guidance. PSEG appropriately initiated NOTFs in response to the inspectors' observations. Examples of these issues included:

- On January 12, 2009, the inspectors found the 'D' EDG safety auxiliaries cooling system (SACS) cooling return valve (EG-2395D) open under conditions where it should normally be closed as a result of a failed component in the valve closing circuit. This is a repeat issue from an identical NRC inspector observation on November 20, 2008, however this issue is considered minor because it does not impact the safety function of the system because the valve is required to be open during a design basis event. (NOTF 20397661).

- The inspectors noticed numerous paint splatters on the 'C' and 'D' EDG fuel racks. PSEG noted that they appeared to be longstanding paint splatters (no recent painting performed) and initiated actions to clean the fuel racks. The issue is considered minor because the painted fuel racks did not adversely impact EDG operability. However, the inspectors noted that PSEG has received and evaluated NRC and industry OE warning that paint on fuel racks can result in EDG operability concerns, and had not previously identified the condition on their equipment. (NOTF 20399792).
- The inspectors noted several unidentified material condition and housekeeping issues in the 'A' and 'B' RHR heat exchanger and pump rooms which were not in accordance with station program requirements and had not been identified by PSEG. The issues include, scaffold contact with small bore piping, control of transient combustible material, control of loose parts and tools, and control of longstanding drip bags and vent hoses (NOTF 20397900). The inspectors determined that none of the issues, individually or collectively, impacted RHR operability; therefore, the issue is minor.
- During plant walkdowns, the team observed several equipment malfunction information system (EMIS) tags (7 out of 11 tags sampled) still hanging that should have been removed following corrective maintenance (NOTF 20399885). Although, this would not represent a violation of regulatory requirements, EMIS tags left hanging after work completion may potentially mask a future degraded condition. EMIS tag deficiencies represent a recurring corrective action program (CAP) weakness based upon previous NRC PI&R inspection observations at Hope Creek.

The inspectors verified that PSEG trended equipment and programmatic issues in order to identify emerging issues at a low level. In general, PSEG personnel identified emerging trends at a low level and used the CAP to conduct evaluations and implement corrective actions when appropriate. However, the inspectors identified examples of less than adequate trending. For example, the inspectors identified, based on documentation presented for review, that engineering did not adequately trend and appropriately prioritize an adverse condition that eventually impacted the operability of the 'B' EDG. Specifically, engineering did not adequately trend the 'B' EDG LO strainer D/P since February 2007. Thus PSEG did not identify a monitored parameter ('B' EDG LO Strainer D/P) was about to go out of specification and missed an opportunity to schedule corrective maintenance to replace or clean the strainer into a planned EDG maintenance availability in February 2008. This issue represented a missed opportunity to address an off normal condition which continued to degrade. (NOTF 20398816). See section 4OA2.1.c.3 for further details.

The inspectors independently evaluated the problem identification deficiencies noted above for potential significance per the guidance in Inspection Manual Chapter (IMC) 0612, Appendix B "Issue Screening" and Appendix E, "Examples of Minor Issues." Minor violations of NRC Requirements are not subject to enforcement action in accordance with the NRC Enforcement Policy. However, these minor violations, and observations support the inspectors' overall assessment, that PSEG's performance was adequate with weaknesses noted in the area of problem identification.

### Effectiveness of Prioritization and Evaluation of Issues

The inspectors determined that, in general, PSEG adequately prioritized and evaluated issues commensurate with the safety significance of the identified problem. NOTFs were screened for operability and reportability, categorized by significance, and assigned to a department for evaluation and resolution. The various NOTF screening and management review groups considered human performance issues, radiological safety concerns, repetitiveness, adverse trends, and potential impact on the safety conscious work environment (SCWE) during the conduct of reviews.

However, the inspectors did identify several issues related to equipment operability evaluations, and extent of condition reviews. One of these issues involved a violation of NRC requirements related to procedural change resulting in a non-conservative Technical Specification ST acceptance criteria. See section 4OA2 1.c.3 for further details.

The inspectors noted several issues related to operability evaluations for safety-related equipment. This concern is best illustrated by PSEG's evaluation of the continued operability of the 'B' EDG.

- OPEVAL 09-01 Revision 0 did not consider all adverse impacts which could affect operability. As background, TS 4.8.1.1.2.A.8 requires verifying the LO pressure, temperature and D/P across the LO filters to be within manufacturer's specifications. The strainer vendor guidance indicated that when the D/P reaches 18-20 psid the element should be removed and replaced. The PSEG EDG ST acceptance criteria to ensure compliance with TS 4.8.1.1.2.A.8 was listed as 20 psid. Specifically, from the time the 'B' EDG LO strainer D/P trended above 15 psid during the 24-hour EDG run in October 2008 through January 13, 2009, PSEG missed several opportunities to question the ability of the 'B' EDG to perform its safety function for the required 24 hour mission time. In response to the inspector's questions, PSEG generated OPEVAL 09-01 Revision 0. However, the OPEVAL did not discuss the adverse impact on EDG LO manifold pressure due to the abnormally high strainer D/P and instead focused on strainer structural integrity limits.
- OPEVAL 09-01 Revision 1 made a non-conservative assumption. This OPEVAL calculated that peak 'B' EDG LO Strainer D/P following a 24 hour DBA mission time run would be 18.8 psid, and therefore concluded that the 'B' EDG was operable. The loading rate was calculated using historical ST data over the time period this strainer element had been in service. The inspectors concluded this was a non-conservative assumption and questioned the accuracy of this calculation given the higher D/P loading rates observed in 2008.
- OPEVAL 09-01 Revision 2 did not follow vendor recommendations or consider relevant industry operating experience. The OPEVAL calculated peak EDG LO strainer loading would be 22.5 psid based on the rate of change observed in October 2008. Despite the 20 psid limit PSEG concluded the EDG would still be operable. The evaluation stated that EDG ST data showed that even at a D/P of 15 psid, the 'B' EDG LO manifold pressure (86 psig) and filter D/P (0.0 psid) were in the normal band, which indicates that sufficient lube oil flow is maintained with sufficient margin for strainer D/P of 22.5 psid. The inspectors noted that the EDG manufacturer's vendor manual Operating Chart listed the normal condition for LO pressure as 90-95

- psig and the manual also stated “it is a bad practice to knowingly let the LO pressure fall below normal, with the thought in mind of using these pressure switches as protection, in lieu of proper maintenance.” The inspectors were also concerned that operating outside the normal range of LO pressure (even above the low LO pressure trip setpoint) could adversely impact the reliability of the EDG. This was based upon recent industry OE (NRC IN 2007-027, high strainer D/P resulted in momentary low LO pressure and wiped a crankshaft bearing causing EDG failure).
- OPEVAL 09-01 Revision 3 also made a non-conservative assumption. The OPEVAL assumed that D/P loading would continue to be linear and constant as strainer D/P approached and exceeded 20 psid. The inspectors concluded that the assumption of a linear ramp rate was non-conservative as the strainer loading appeared to increase based on review of historical data and review of The Flow Control Institute (FCI) Standard #89-1 which stated, “As a strainer becomes clogged to the point where the open area ratio (OAR) of the strainer approaches the pipe area, the pressure drop across the strainer increases very rapidly and unpredictably. It is at this point, therefore, that it is recommended the strainer be cleaned.” The inspectors then asked PSEG to provide the strainer OAR at 20 psid (to ensure that the loading would not be unpredictable above 20 psid) and/or information concerning vendor tests for their strainer, in order to verify the PSEGs assumption that D/P loading would continue to be linear and constant. PSEG, had not consulted with the strainer vendor, to determine what the basis of the 20 psid limit was and what would happen operating above this limit. Subsequently, engineering determined that the vendor had no information on the strainer OAR at any D/P and that the strainers were only tested up to 8 psid. Based on this information, engineering declared the ‘B’ EDG inoperable as the strainer performance above 20 psid was indeterminate.
  - Several early evaluations made incorrect assumptions. These evaluations stated that “the current maximum LO strainer D/P (20 psid) shown in the EDG ST procedures is not a TS requirement, and should not be noted as test acceptance criteria.” Engineering determined, that TS 4.8.1.1.2.A.8 did not apply to the EDG LO strainer, only the LO filter. This position is contrary to the Hope Creek UFSAR describing EDG LO system operation, the EDG vendor manual, and IEEE Standard 387, “IEEE Standard Criteria for Diesel Generator Units Applied as Standby Supplies for Nuclear Power Generating Stations.”

In addition to the ‘B’ EDG LO Strainer issues, the inspectors noted the following observations which also supported the overall assessment:

- The inspectors identified that the extent of condition for the ‘A’ SW strainer failure in November 2007 (70077305) resulted in less than adequate corrective actions with respect to the ‘B’ SW strainer. In November 2007, engineering based the continued operability of the ‘B’ SW strainer on a June 2006 photo and incorrectly determined that “there are no backwash arms installed at Hope Creek with single pass ¼” fillet weld design like the one that failed” in the ‘A’ SW strainer. Based on this assumption, PSEG took no action to inspect the ‘B’ backwash arm. PSEG missed an opportunity to confirm their assumption during an April 2008 strainer internal work window. Subsequently, a January 2009 ‘B’ SW strainer inspection revealed a crack in a single-pass weld on the backwash arm (NOTF 20397691). Fortunately, the crack had not propagated to the point where it challenged operability and, as a result, this issue was considered to be minor. (NOTF 20399719).

- The inspectors identified a weakness in PSEG's implementation of the CAP process. Specifically, the inspectors identified several examples where repeat occurrences and degrading conditions were added to an original NOTF without re-screening the issue through SOC or initiating a new NOTF to ensure proper operability reviews and prioritization. The team identified several examples, the most significant being a NCV for failing to write new NOTFs as directed by a procedure associated with the 'B' EDG LO strainer D/P. (Section 4OA2.1.c.3). PSEG initiated NOTF 20397763 to evaluate this programmatic weakness.

The inspectors independently evaluated the problem identification deficiencies noted above for potential significance per the guidance in Inspection Manual Chapter (IMC) 0612, Appendix B "Issue Screening" and Appendix E, "Examples of Minor Issues." Minor violations of NRC Requirements are not subject to enforcement action in accordance with the NRC Enforcement Policy. However, these minor violations, and observations support the inspectors' overall assessment, that PSEG's performance was adequate with weaknesses noted in the area of problem evaluation.

#### Effectiveness of Corrective Actions

The inspectors concluded that, in general, corrective actions for identified deficiencies were typically timely and adequately implemented. However, the inspectors noted some weaknesses including one issue that resulted in multiple trips of the 'A' Control Room Chill Water Pumps which was determined to be a violation of NRC Requirements. See section 4OA2.1.c.1 for additional details. Weaknesses in PSEG's resolution of degraded conditions, documentation of actions, and completion of identified corrective actions were also noted. Examples included:

- In April 2006, PSEG initiated NOTF 20279178 to correct non-conservative TS acceptance criteria found in their Loss of Offsite Power/Loss of Coolant Accident (LOP/LOCA) procedures. Specifically, TS 4.8.1.1.2.h.9 requires verification that the auto-connected loads to each EDG do not exceed the continuous rating of 4430 KW. In January 2009, the inspectors independently checked the four LOP/LOCA procedures and identified that PSEG had not revised the procedures to correct the non-conservative TS acceptance criteria. The inspectors noted that PSEG had closed the corrective action item after sending the procedure revision to the procedure writers without ensuring that the changes were actually completed. PSEG promptly initiated corrective actions to verify that no EDG loading exceeded the continuous rating during the October 2007 LOP/LOCA tests and to affect the required procedures changes prior to the LOP/LOCA tests scheduled for April 2009. Since no actual loading exceeded the continuous rating, this issue was considered to be of minor significance. (NOTF 20399815)
- The inspectors also noted that PSEG's corrective actions to address longstanding challenges to SW reliability and availability had not been fully effective. In particular, external events, such as grassing and SW travelling water screen carryover, still provide frequent challenges to the SW strainer integrity. For example, recent grass intrusion resulted in elevated D/Ps in excess of the 30 psid structural rating of the SW strainers and necessitated increased monitoring by engineering to closely trend SW flows to identify if the downstream SACS heat exchangers started to load up with detritus or other SW debris that may be bypassing a failed strainer element. Although engineering took actions to expand the SW strainer D/P indication range so

that operators can document the maximum D/P seen during grass intrusion and engineering closely monitors available SW parameters, PSEG had not yet completed actions to significantly strengthen the SW strainer elements and/or minimize the excessive loading on the SW strainers during grassing events. Given the seasonal nature of grassing events, this corrective action would be considered untimely. However, since this condition has not resulted in unavailability of a safety-related system, it is considered minor.

- On July 24, 2007, a safety-related 4160 volt breaker did not operate as expected due to hardened grease in the breaker mechanism. This resulted in an NRC NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action." The corrective action to preclude recurrence was revising the breaker overhaul frequency from 12 years to 6 years. This action was not completed at the time of the inspection and was tracked in another notification and classified as a significance level 5 (enhancement not to be trended). The inspectors determined that not implementing the corrective actions could have resulted in untimely corrective actions. The inspectors determined that this issue was minor because the component engineer was monitoring the replacements of all breakers, all safety-related breakers that were in service for greater than 6 years had been replaced, and none of the breakers to date exhibited grease hardening issues. In addition, an effectiveness review for the original notification was scheduled and one of the tasks was to review whether or not the corrective actions were completed. (NOTF 20345624)

Finally, the inspectors also noted that, in general, PSEG completed effectiveness reviews for significant issues to verify that implemented CAs were effective.

The inspectors independently evaluated the problem identification deficiencies noted above for potential significance per the guidance in Inspection Manual Chapter (IMC) 0612, Appendix B "Issue Screening" and Appendix E, "Examples of Minor Issues." Minor violations of NRC Requirements are not subject to enforcement action in accordance with the NRC Enforcement Policy. However, these minor violations, and observations support the inspectors' overall assessment, that PSEG's performance was adequate with weaknesses noted in the area timely and effective corrective actions.

c. Findings

(1) Inadequate Corrective Actions for Susceptibility of Air Accumulation in the 'A' Control Area Chill Water System.

Introduction. A self-revealing Green NCV of 10 CFR 50, Appendix B, Criteria XVI, "Corrective Actions," was identified for PSEG's failure to implement corrective actions to eliminate or mitigate air accumulation in the 'A' CACW system, an identified condition adverse to quality.

Description. In December 2008, the 'A' CACW pump tripped due to loss of suction pressure caused by air accumulation. The 'A' CACW pump has had historical issues with air accumulation in the system causing pump trips and resulting in a loss of a train of control room ventilation. In 2005, a series of trips resulted in the NRC issuing NCV 05000354/2005002-02 due to inadequate corrective actions. However, in 2008, the 'A' CACW pump tripped in February following maintenance, again in July, and again in December. After each trip, a significant amount of air was vented from the system. PSEG conducted an apparent cause evaluation (70087284) following the July 2008 trip.

The ACE identified that the July trip was due to air accumulation while the system was in a standby configuration. It was also recognized that PSEG did not have a program to monitor for air accumulation as it did for other susceptible systems and that this system was historically susceptible to air accumulation issues. In addition, PSEG corrective actions in response to GL- 2008-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems," directed the establishment of a monitoring program to monitor for air accumulation in the CACW system. However, this monitoring consisted of reviewing CAP data, vice periodic venting or Ultra Sonic Testing. As a result, effective corrective actions were not developed to address this condition adverse to quality and as a result the pump tripped again in December 2008.

It was also noted by the inspectors that corrective actions from the 2005 NRC NCV did address periodic venting and running of idle pumps; however, these corrective actions were not incorporated into permanent operating procedures and thus were allowed to expire.

The inspectors determined that PSEG failing to develop corrective actions to address air accumulation, a condition adverse to quality, as required by the PSEG CAP, is a performance deficiency. This performance deficiency was reasonably within PSEG's ability to foresee and prevent due to the historical issues with the 'A' CACW Pump, and the findings of July 2008 ACE.

Analysis. PSEG failing to develop corrective actions to address air accumulation, a condition adverse to quality, is a performance deficiency. This finding is more than minor because it affects the equipment performance attribute of the Mitigating Systems Cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding screens to Green using Inspection Manual Chapter 0609 Attachment 4, "Phase I - Initial Screening and Characterization of Findings," because the finding did not represent the loss of a safety function, did not result in a train of the system being unavailable for greater than its allowed TS outage time, and was not determined to be potentially risk significant due to seismic, flooding, or severe weather initiating events.

The finding has a cross-cutting aspect in the area of problem identification and resolution and the aspect of problem evaluation (P.1.C) because PSEG did not thoroughly evaluate problems such that resolutions address causes and extent of conditions as necessary. Specifically, appropriate corrective actions were not developed to mitigate or eliminate air accumulation in the CACW system, an identified condition adverse to quality.

Enforcement. 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, from July to December 2008, PSEG failed to properly identify and correct a condition adverse to quality associated with the 'A' CACW pump to maintain the pump reliable and available when needed. However, because this finding is of very low safety significance and has been entered into the PSEG's corrective action program (NOTF 20396188), this violation is being treated as a non-cited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000354/2009006-01, Inadequate Corrective Actions for Susceptibility of Air Accumulation in the 'A' Control Area**

### **Chill Water System.)**

#### **(2) Non-Conservative Acceptance Criteria in Emergency Diesel Generator Test Procedures**

Introduction: The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," for PSEG's failure to ensure that EDG ST procedures had appropriate acceptance criteria that incorporated the limits from applicable design documents. Specifically, PSEG did not provide EDG ST acceptance criteria associated with the D/P across the EDG lube oil strainers which would ensure the ability of the EDGs to perform their safety function for the duration of its designed 24-hour mission time when the procedure was changed in 2002. As a result, from October 2008 to January 2009, the 'B' EDG was declared operable when, in fact, operability was indeterminate.

Description: Hope Creek TS 4.8.1.1.2.A.8 requires verifying the LO pressure, temperature and D/P across the LO filters to be within manufacturer's specifications. The EDG manufacturer's vendor manual specified that the LO strainer was to be cleaned when the D/P exceeded 10 psid. The strainer vendor stated that when the D/P reaches 18-20 psid the element should be removed and replaced. In April 2002, PSEG revised the acceptance criteria to ensure compliance with TS 4.8.1.1.2.A.8 from 15 psid to 20 psid. This was based on the strainer vendor's recommended cleaning (20 psid), being the limit for operability. The inspectors found neither strainer vendor information, nor an acceptable PSEG evaluation supporting operation above 20 psid.

The purpose of the monthly ST acceptance criteria is to demonstrate that the associated EDG is operable "as left." Thus at the completion of the ST if the EDG parameters meet the associated acceptance criteria, this would be a reasonable basis to conclude that the EDG is capable of completing its safety function during a design basis accident. This requires the EDG to run at rated load for 24 hours. A ST acceptance criteria of 20 psid is not acceptable because no margin is allowed for LO D/P to rise over a 24 hour run. Actual strainer data in 2002 and 2008 showed that rate of strainer D/P rise per hour of engine run time increases as strainer loading increases and is historically at a value of 2.5-3.5 hours per 1 psid rise when initial loading is greater than 7 psid. Since there is no guidance or testing data that supports running the EDG with a LO strainer D/P of greater than 20 psid, the revised ST acceptance criteria creates a situation where the EDG can meet the acceptance criteria, yet the EDG not be able to complete its DBA mission time without exceeding a parameter which would render the EDG inoperable. Therefore, the revised ST acceptance criteria does not meet the requirements of 10 CFR 50 Appendix B Criteria XI. As a result, eight TS ST procedures (the monthly and 18 month EDG surveillance test procedures for each of the four EDGs) contained an inadequate acceptance criteria. These STs were performed over 300 times since April 2002.

The inspectors reviewed the 2002 procedure change evaluations and the 10 CFR 50.59 screenings and determined that the reviews conducted did not address the fact that the acceptance criteria must ensure the EDG could perform its safety function for its 24 hour mission time in the as left condition. Consequently, from October 2008, when the 'B' EDG was secured with a recorded D/P of 15.5 psid, to January 2009, the 'B' EDG met an inadequate ST acceptance criteria and was declared operable when, in fact, operability of the machine was indeterminate.

Based on the inspector's questions, PSEG reviewed the concerns and declared the 'B'

EDG inoperable on January 29, 2009. PSEG's corrective actions included replacing the EDG lube oil strainer, revising the EDG ST procedures, and performing an extent of condition review.

The inspectors determined that PSEG failing to establish an adequate TS ST acceptance criteria as required by the PSEG Quality Assurance program, is a performance deficiency and was reasonably within PSEG's ability to foresee and prevent due to the engineering and management reviews which did not identify the error in the procedure change process.

Analysis: PSEG failing to establish an adequate TS ST acceptance criteria is a performance deficiency. The finding is more than minor because the performance deficiency is associated with the procedure quality attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems (EDGs) that respond to initiating events to prevent undesirable consequences. This finding screens to Green using Inspection Manual Chapter 0609 Attachment 4, "Phase I - Initial Screening and Characterization of Findings," because the finding did not represent the loss of a safety function, did not result in a train of the system being unavailable for greater than its allowed TS outage time, and was not determined to be potentially risk significant due to seismic, flooding, or severe weather initiating events.

The inspectors determined that there is no cross-cutting aspect associated with this finding. The most significant contributing cause for this performance deficiency was weaknesses in the procedure change review process and 10 CFR 50.59 Screening process. However, since 2002, both of these processes have been revised and updated. These revisions included more detailed questions and additional levels of review, which make it more likely that this issue would have been identified during the review process. Therefore, the inspectors concluded that this contributing cause was not reflective of current performance.

Enforcement: 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," states, in part, that a test program shall be established to assure that all testing required to demonstrate that structures, systems and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. Contrary to the above, from April 5, 2002, to January 29, 2009, engineering did not incorporate the requirement of the EDGs to provide their safety function for the duration of their designed 24-hour mission time into the EDG ST acceptance criteria. Because this issue was of very low safety significance, and it was entered into PSEG's CAP (NOTF 20399876), this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000354/2009006-02, Non-Conservative EDG Test Acceptance Criteria)**

(3) Failure to Follow Procedures Contributes to Emergency Diesel Generator Inoperability

Introduction: The inspectors identified a Green NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for PSEG's failure to adequately implement procedure requirements related to the maintenance and operation of the EDGs. Specifically, PSEG did not write a new NOTF as required for an out of specification D/P across the 'B' EDG lube oil strainers multiple times from February 2008

to January 2009. As a result, an out of specification system parameter was not re-screened for operability following a substantive change in this parameter resulting in the 'B' EDG being declared inoperable.

Description: During the 'B' EDG monthly ST on January 12, 2009, the inspectors observed that the LO strainer D/P was abnormally high (15.5 psid vice the normal value of less than 5 psid). While assessing the operability of the 'B' EDG and potential causal factors, the inspectors identified a number of examples where NOTFs were not initiated as required by procedures. Specifically, PSEG procedure HC.OP-ST-KJ-0002, "Emergency Diesel Generator 1BG400 Operability Test – Monthly," Attachment 4, requires operators to submit a NOTF to clean the LO strainer if the strainer D/P exceeds 7 psid. Contrary to this requirement, operators documented that the 'B' EDG LO strainer D/P was 7.5 psid on February 13, 2008, and 8 psid on March 10, 2008; but, they did not initiate a corrective action NOTF. On April 14, 2008, operators initiated NOTF 20365674 for a LO strainer D/P of 8.5 psid.

In June 2008 and July 2008, the 'B' EDG LO strainer D/P was greater than 7 psid; however, operators or engineering did not initiate a NOTF as required by the EDG ST procedure nor did they update the April 2008 NOTF. In May, August, and September 2008 the 'B' EDG LO strainer D/P was also greater than 7 psid and the operators updated the April 2008 NOTF.

In October 2008, the 'B' EDG LO strainer D/P was 9 psid during monthly EDG test and trended up to 15.5 psid during the 24-hour endurance run; however, neither operators or engineering initiated a NOTF nor did they update the April 2008 NOTF. It should also be noted that during the October endurance run, the EDG LO Strainer High D/P alarm came in. This represented a significant change in the monitored parameter; however, a NOTF was not written for the receipt of the alarm or as required by the surveillance procedure. Given the fact that LO D/P was observed to rise from 8 psid to 15.5 psid during the 24 hour endurance run, and that the 'B' EDG has a required mission time of 24 hours, it is reasonable to conclude that LO D/P would exceed the operability limit of 20 psid during its 24 hour run, thus placing the operability of the machine in question. However, since a NOTF was not written, operability was not evaluated.

In November 2008, December 2008, and January 2009, the 'B' EDG LO strainer D/P was recorded to be 14 psid or greater. Although operators did not initiate a new NOTF, they did update the April 2008 NOTF. However, because the original NOTF was updated, vice writing a new NOTF as required, this change in condition was not evaluated for operability.

On January 13, 2009, the inspectors questioned whether engineering and operations had adequately assessed the operability of the 'B' EDG given the adverse trend in LO strainer D/P. Specifically, from the time the 'B' EDG LO strainer D/P trended above 15 psid during the 24-hour EDG run in October 2008 through January 13, 2009, PSEG missed several opportunities to question the ability of the 'B' EDG to perform its safety function for its required mission time.

On January 29, 2009, following several operability discussions with the inspectors; PSEG declared the 'B' EDG inoperable, tagged it out of service, replaced the LO strainer, and restored operability. PSEG initiated NOTF 20398816 to evaluate the condition and to perform an extent of condition review.

The inspectors determined that PSEG's failure to adequately implement procedure requirements related to the maintenance and operation of the EDGs was a performance deficiency. This performance deficiency was reasonably within PSEG's ability to foresee and correct since EDG surveillances are performed and reviewed monthly.

Analysis: PSEG's failure to adequately implement procedure requirements related to the maintenance and operation of the EDGs is a performance deficiency. The finding was more than minor because the performance deficiency was associated with the human performance attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems (EDGs) that respond to initiating events to prevent undesirable consequences. The inspectors performed a review of this issue using Inspection Manual Chapter 0609 Attachment 4, "Phase I - Initial Screening and Characterization of Findings."

The inspectors determined that because the EDG was declared to be inoperable and past operability had not yet been determined at the time of this report, it was conservative to assume that the diesel would not have been able to perform its safety function from October 16, 2008 until January 30, 2009, therefore representing an actual loss of safety function of a single train for greater than its TS allowed outage time (72 hours for the 'B' EDG). This assumption allows a bounding risk analysis to be performed. The inspectors then performed a Phase 2 SDP using the Hope Creek risk informed inspection notebook. The Phase 2 SDP evaluated the condition for a period of greater than 30 days, which assigns a full year of fault exposure. This is conservative since the actual fault condition was approximately 106 days. The Phase 2 assessment results were greater than green. As a result, a senior reactor analyst (SRA) conducted a Phase 3 assessment.

The SRA completed a Phase 3 SDP evaluation using the Simplified Plant Analysis Risk Model (SPAR) for Hope Creek, Code Version 7.26. The following assumptions were incorporated into the assessment:

- 1) Exposure period 2600 hrs.
- 2) The strainer loading would cause the engine to trip on low lube oil 15 hrs into the event.
- 3) The low lube oil trip would protect the engine from damage as designed.
- 4) The condition would be recoverable. PSEG had the parts available, procedures, and training/experience on replacing EDG LO strainers and the time to complete the job is much less than the time required.

Model Adjustments:

1) Off-site power recovery - Due to the assumption that 'B' EDG could run 15 hrs before it tripped, the off-site power recoveries were adjusted. Essentially, the onset of Station Blackout (SBO) would be offset by 15 hrs. For example the failure to recover offsite power in 1 hour (OEP-XHE-XL-NR01H = 5.3E-001) would change to 16hrs. Based on the values from Table 4-1 of NUREG 6890, 'Reevaluation of Station Blackout Risk at Nuclear Power Plants,' the adjusted value would be 2.8E-2.

2) 'B' EDG Recovery - The recovery of the EDG is a combination of the ability to recognize/correct the strainer issue and successfully restart the engine. In other words,

recovery would fail if the strainer wasn't restored or the engine would not restart. The generic SPAR value for failure-to-start is  $5E-3$ . Based on a SPAR-H, the combined human error probability (HEP) for the strainer was  $2E-3$ . Since the recovery term would tend to be more favorable than the original fail-to-run ( $2.4E-2$ ), a screening value of 0.5 was used. This was deemed to be a conservative assumption.

Additional conservatism, not factored into the model:

1) Several dominant cutsets were influenced by the failure to align firewater (FW1-XHE-XM-EROR) which had a probability of  $9E-1$ . The value credited in the HC SDP notebook for this action is  $1E-3$ . Given the time available, a value close to the SDP notebook would be reasonable.

2) Reactor decay heat loads and containment heat loads would be lower 15 hrs into the event. This would result in more favorable success criteria.

Results:

The dominant accident sequence was a loss of offsite power event with failure to recover offsite power in 10 hours, and a loss of the 'A' train of SW (thus rendering 'A' and 'C' EDGs inoperable).

Internal Events results = A change in core damage frequency (delta CDF) of mid  $E-7$ .

LERF is not a concern due to the onset of SBO and core damage being out close to 24 hrs. (Not early).

External Events – Since the 'B' EDG can be controlled from the remote shutdown panel (RSP) the SRA walked down the RSP and reviewed the Hope Creek IPEE to determine the how the external events would impact of the finding. Given the amount of time available, the relatively low loading conditions of the EDG and likely recovery, it was determined that the contribution due to external events would be small.

Therefore, based on the results of the SRA Phase III bounding case analysis, plant risk was determined to be of very low safety significance (Green) due to delta CDF of mid  $E-7$  and no significant impact to LERF or Frequency of External Events.

The finding has a cross-cutting aspect in the area of Human Performance and the aspect of work practices, procedural compliance, in that PSEG personnel are to follow procedures [H.2.(b)]. Specifically, PSEG personnel did not follow procedure HC.OP-ST-KJ-0002, and write a NOTF each time EDG lube oil strainer D/P was greater than 7 psid.

Enforcement: 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, from February 13, 2008, to January 29, 2009, PSEG failed to adequately implement procedure HC.OP-ST-KJ-0002 requirements to ensure continued EDG operability. Specifically, operators repeatedly documented that the 'B' EDG LO strainer D/P was greater than 7 psid; however, they did not initiated a new NOTF as required. As a result, an out of specification system

parameter was not re-screened for operability following a substantive change in this parameter resulting in the 'B' EDG being declared inoperable. This violation is being treated as a NCV consistent with section VI.A.1 of the NRC Enforcement Policy because the finding was of very low safety significance and has been entered into the corrective action program in notification 20398816. **(NCV 05000354/2009006-03, Failure to Follow Procedures Contributes to Emergency Diesel Generator Inoperability**

.2 Assessment of the Use of Operating Experience (OE)

a. Inspection Scope

The inspectors selected a sample of industry OE issues to confirm that PSEG evaluated the OE information for applicability to Hope Creek and took appropriate actions when warranted. The inspectors reviewed OE documents to verify that PSEG appropriately considered the underlying problems associated with the issues for resolution via their CAP. The inspectors also observed plant activities to determine if industry OE was considered during the performance of routine and infrequently performed activities. A list of the documents reviewed is included in the Attachment.

b. Assessment

The inspectors determined that PSEG appropriately considered industry OE information for applicability, and used the information for corrective and preventive actions to identify and prevent similar issues. The inspectors assessed that, in general, the use of OE was good. OE was appropriately applied and lessons learned were communicated and incorporated into plant operations.

c. Findings

No findings of significance were identified.

.3 Assessment of Self-Assessments and Audits

a. Inspection Scope

The inspectors reviewed a sample of audits, including the most recent audit of the CAP, departmental self-assessments, NOS audits and assessments, and assessments performed by independent organizations. These reviews were performed to determine if problems identified through these assessments were entered into the CAP, when appropriate, and whether CAs were initiated to address identified deficiencies. The effectiveness of the audits and assessments was evaluated by comparing audit and assessment results against self-revealing and NRC-identified observations made during the inspection. A list of documents reviewed is included in the Attachment to this report.

b. Assessment

The inspectors concluded that self-assessments, audits, and other internal PSEG assessments were generally critical, probing, thorough, and effective in identifying issues. The inspectors observed that these audits and self-assessments were completed in a methodical manner by personnel knowledgeable in the subject. The audits and self-assessments were completed to a sufficient depth to identify issues that were entered into the CAP for evaluation. In general, corrective actions associated with

the identified issues were implemented commensurate with their safety significance.

c. Findings

No findings of significance were identified.

.4 Assessment of Safety Conscious Work Environment

a. Inspection Scope

The inspectors reviewed the SCWE at Hope Creek through conduct of the following activities:

- During interviews with staff personnel, the inspector's questioned individuals regarding: willingness to raise safety concerns, knowledge of the avenues available for raising safety concerns, the effectiveness of actions taken by management to foster a SCWE at the site, and knowledge of individuals who had experienced a negative reaction for raising a safety concern.
- The inspectors reviewed implementation of the site employee concerns program (ECP). The inspectors compared the number and type of issues documented in the Hope Creek ECP between August 2007 to December 2008 to the number and type of issues documented as Hope Creek NRC allegations for that same period. The inspectors reviewed the site procedure for conducting ECP investigations and reviewed a sample of ECP files to assess the program's effectiveness at addressing potential safety issues.
- The inspectors reviewed the results of site nuclear safety culture surveys performed in 2008.

b. Assessment

Based on interviews, observations of plant activities, and reviews of the CAP and the ECP, the inspectors determined that in general site personnel were willing to identify and raise safety issues. All persons interviewed demonstrated an adequate knowledge of the avenues available for raising safety concerns including CAP and ECP. In addition, comparisons of Hope Creek ECP files to NRC allegation information did not identify any impediments to the free flow of information at Hope Creek.

The inspectors determined that the results of the nuclear safety culture surveys conducted in 2008 provided PSEG insights into the safety culture of the site workforce. Based upon the results of these surveys, PSEG determined that overall Hope Creek was generally aligned with the principles of a strong nuclear safety culture.

c. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

On January 30, 2009, the inspectors presented the inspection results to

Mr. J. Perry, Hope Creek Plant Manager, and other members of the Hope Creek staff. The inspectors confirmed that proprietary information was reviewed by inspectors and returned to the licensee during the course of the inspection, but the content of this report includes no proprietary information.

**ATTACHMENT: SUPPLEMENTAL INFORMATION**

**SUPPLEMENTAL INFORMATION****KEY POINTS OF CONTACT**Licensee personnel

K. Coslett, FIN SRO  
 G. Daves, Electrical Systems Manager  
 T. Devik, Regulatory Assurance Engineer  
 M. Gaffney, Regulatory Assurance Manager  
 K. Knaide, Site Engineering Director  
 R. LaSala, System Engineer (SW)  
 E. Martin, System Engineer (EDG)  
 J. Perry, Plant Manager  
 M. Reed, Operations Shift Manager  
 G. Stith, Engineering Response Manager  
 G. Lichty, Component Manager  
 D. Schiller, Senior System Engineer  
 A. Shabazian, Engineering-Maintenance Rule Coordinator  
 T. Foster, Maintenance  
 R. Cummins, Engineering  
 P. Duca, Regulatory Assurance Engineer  
 K. Yearwood, Systems Engineering  
 M. Headrick, Employee Concerns Program  
 J. King, Systems Engineering  
 R. Vondrasek, Emergency Preparedness

State of New Jersey Bureau of Nuclear Engineering

J. Humphreys, Engineer

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

05000354/2009006-01	NCV	Inadequate Corrective Actions for Susceptibility of Air Accumulation in the 'A' Control Area Chill Water System. (Section 4OA2.1.c.(1))
05000354/2009006-02	NCV	Non-Conservative EDG Test Acceptance Criteria (Section 4AO2.1.c.(2))
05000354/2009006-03	NCV	Failure to Follow Procedures Contributes to Emergency Diesel Generator Inoperability (Section 4AO2.1.c.(3))

## LIST OF DOCUMENTS REVIEWED

### Section 40A2: Identification and Resolution of Problems

#### Audits and Self-Assessments

70065684, Mods and 50.59 Self-Assessment, dated 5/16/07  
 70085238, Human Performance FASA Procedure Use and Adherence, dated 6/30/2008  
 70073823, NRC Procedure Cross Cutting Issues, dated 6/27/08  
 Hope Creek Engineering DRUM Report, 3<sup>rd</sup> Quarter 2008  
 NOSA-HPC-07-05 (80093185), Engineering Design Control Audit Report, dated 9/6/07  
 NOSA-HPC-07-07 (80093869), Operations Audit Report, dated 12/5/07  
 NOSA-HPC-08-06 (80095905), Engineering Programs, dated 7/23/08  
 NOSPAC-08-3C, Nuclear Oversight Performance Assessment Report Hope Creek  
 Generating Station (HCGS), dated 10/31/08

#### Notifications (NOTF) and Work Orders full review

20397877*	20398082*	20399719*
20397970*	20398098*	20399559*
20398073*	20398100*	20399666*
20398685*	20398156*	20399702*
20399695*	20398157*	20399709*
20398177*	20398158*	20399719*
20398178*	20398174*	20399792*
20398155*	20398394*	20399815*
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20397669*	20399071*	20399885*
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20397799*	20399073*	20399961*
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20083532	20222457	20298753
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20156133	20223692	20302974
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20173664	20225777	20318065
20180832	20243610	20320342
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20196015	20263903	20326142
20206786	20265027	20326761
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20329927	20346632	20363600
20330350	20346788	20365674
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20331137	20348944	20366791
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20333260	20350896	20367412
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20333922	20351505	20369372
20333924	20351612	20369786
20334061	20351879	20370390
20334542	20352014	20370664
20335119	20352022	20371315
20335275	20352033	20371438
20335478	20352041	20371775
20335480	20352251	20371864
20335486	20353284	20372487
20335561	20353643	20372531
20335737	20354473	20373840
20336000	20354500	20374306
20336731	20354697	20374701
20337176	20354746	20374823
20339843	20355034	20374961
20339889	20355035	20375884
20340295	20355495	20376190
20340517	20356470	20376439
20340602	20357019	20376440
20340792	20357147	20376906
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20341278	20357483	20377207
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20342239	20358409	20377960
20342527	20358437	20379220
20342758	20358443	20379376
20343032	20358454	20379439
20343856	20358461	20379705
20343863	20358511	20379894
20344355	20360203	20380534
20344386	20360501	20380649
20344829	20361578	20381129
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20385139	30116046	70073704
20385385	50108970	70073705
20385700	50118527	70073823
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20386284	60066004	70074155
20386317	60071485	70075225
20388632	60071806	70075601
20388749	60072058	70075601
20389009	60073363	70076318
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20391640	60075149	70076868
20391876	60076975	70076870
20392264	60077306	70076892
20392658	60077340	70076985
20392809	60077855	70077173
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20393497	70022594	70077400
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20395653	70052503	70080913
20395653	70054516	70081531
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20397894	70071891	70083143
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20398259	70071993	70084563
20398414	70072347	70085168
20398839	70072347	70085176
20398895	70072524	70085238
20399113	70072856	70085367
20399470	70072903	70085746
20399728	70073034	70085846
20399788	70073565	70086108

70086629	70089388	80020042
70086842	70090154	80038981
70086869	70090304	80043438
70087139	70090379	80046907
70087284	70091657	80062840
70087284	70091917	80075209
70087409	70091952	80082646
70087668	70092792	80087548
70088046	70092951	80087800
70088089	70092952	80092092
70088099	70093083	80094685
70088599	70093713	

\*NRC Identified During Inspection

#### Drawings

Drawing 030-01, RCIC System and Instrumentation, Rev. 5

Drawing 026-01, HPCI System, Rev. 2

Drawing M-56-1-31, Hope Creek Generating Station HPCI Turbine, Rev. 16, Sheet 1  
1-P-EG-25, System Isometric/Auxiliary Bldg. Diesel Generator Cooling Water 1E Chillers,  
Rev. 9

A-P757-0, Floor-Penetration Seals Aux. Bldg.-Control/Diesel EI 130'-0", Rev. 6

#### Procedures

AD-AA-102-1001, Station Qualified Reviewer's Guide, Rev. 5

ER-AA-310-1004, Maintenance Rule, Rev. 7

ER-AA-390-1001, Control Room Habitability Program, Rev. 0

HC.MD-PM.PB-0001, 4.16 KV Breaker Cleaning and P.M., Rev 23

HC.MD-ST.PB-0003, Class 1E 4.16 KV Feeder Degraded Voltage Monthly Instrumentation  
Channel Functional Test, Rev. 25

HC.OP-AB.RPV-0001(Q), Reactor Power, Rev. 11

HC.OP-AB.ZZ-0001(Q), Transient Plant Conditions, Rev. 16

HC.OP-BD.0001(Q), Reactor Core Isolation Cooling Pump-OP203 – Inservice Test, Rev. 43

HC.OP-DL.ZZ-0006(Q), Log 6 Auxiliary Building Log, Rev. 48

HC.OP-EO.ZZ-0322(Q), Core Spray Injection Valve Override, Rev. 1

HC.OP-IS.BJ-0001(Q), HPCI Main and Booster Pump Set – 0P204 and 0P217 – Inservice Test,  
Rev. 51

HC.OP-IS.BJ-0101(Q), High Pressure Coolant Injection System Valves – Inservice Test,  
Rev. 55

HC.OP-SO.BJ-0001(Q), High Pressure Coolant Injection System Operation, Rev. 35

HC.OP-ST.BJ-0002(Q), HPCI System Functional Test (Low Pressure) and HPCI System  
Response Time Test (High Pressure), Rev. 36

HC.OP-ST.BJ-0003(Q), HPCI System Valve Actuation Functional Test, Rev. 1

HC.OP-ST.GK-0002(Q), Control Room Emergency Filtration System Isolation/Actuation  
Functional Test- 18 months, Rev. 8

HC.RP-GP.SP-0001(Q), Control of Radiation Monitoring System Setpoints, Rev. 25

LS-AA-125, "Corrective Action Program Procedure" Rev. 12

NC.RP-TI.ZZ-0403(Q), Operation of Breathing Air Systems, Rev. 2

OP-AA-101-112-1002 On Line Risk Assessment, Rev. 3

OP-AA-106-101-1005, Quarantine of Areas, Equipment, and Records, Rev. 0  
RP-AA-300, Radiological Survey Program, Rev. 3  
RP-HC-4003, Reactor Start Up and Shutdown Radiological Controls, Rev. 0

Completed Surveillances

HC.IC-CC.SK-0004(Q), HPCI-Division 3 Steam Leak Detection Temperature Monitor  
H1SK- 1SKXR-11504, completed 10/3/2008  
HC.IC-CC.SK-0004(Q), HPCI-Division 3 Steam Leak Detection Temperature Monitor  
H1SK- 1SKXR-11504, completed 10/5/2008  
HC.IC-FT.SK-0002(Q), RCIC-Division 4 Steam Leak Detection Temperature Monitor  
1SKXR-11503, completed 11/16/2008  
HC.OP-IS.BJ-0001(Q), HPCI Main and Booster Pump Set – 0P204 and 0P217 – Inservice Test,  
completed 1/26/2009  
HC.OP-IS.EA-0001, 'A' Service Water Pump - AP502 - In-Service Test, completed 1/1/09  
HC.OP-IS.EA-0002, 'B' Service Water Pump - BP502 - In-Service Test, completed 10/16/08  
HC.OP-IS.EA-0003, 'C' Service Water Pump - CP502 - In-Service Test, completed 12/16/08  
HC.OP-IS.EA-0004, 'D' Service Water Pump - AP502 - In-Service Test, completed 11/23/08  
HC.OP-IS.EG-0001, 'A' SACS Pump - AP210 - In-Service Test, completed 1/1/09  
HC.OP-IS.EG-0002, 'B' SACS Pump - BP210 - In-Service Test, completed 12/23/08  
HC.OP-IS.EG-0003, 'C' SACS Pump - CP210 - In-Service Test, completed 11/8/08  
HC.OP-IS.EG-0004, 'D' SACS Pump - D/P210 - In-Service Test, completed 11/22/08  
HC.OP-ST.GK-0002(Q), Control Room Emergency Filtration System Isolation/Actuation  
Functional Test- 18 months, completed 12/18/08  
HC.OP-ST.KJ-0001, Emergency Diesel Generator AG400 Operability Test - Monthly, completed  
12/31/08  
HC.OP-ST.KJ-0002, Emergency Diesel Generator BG400 Operability Test - Monthly, completed  
2/16/07, 10/16/08, 12/8/08  
HC.OP-ST.KJ-0003, Emergency Diesel Generator CG400 Operability Test - Monthly, completed  
12/1/08  
HC.OP-ST.KJ-0004, Emergency Diesel Generator DG400 Operability Test - Monthly, completed  
12/16/08  
HC.OP-ST.KJ-0015, EDG 1BG400 – 24 Hour Operability Run and Hot Restart Test, completed  
10/16/08

Licensee Event Reports

2007-003-00, Grab Samples Not Performed As Required By Technical Specification 3.3.7.1  
2008-003-000, HPCI Inoperability due to Instrument Failure Initiated Turbine Trip

Findings

FIN 05000354/2007005-08, Occupational Radiation Exposure Not As Low As Reasonably  
Achievable During Refueling Outage (70081540)

Non-Cited Violations

NCV 05000354/2005002-02, Inadequate Corrective Action for 'A' Control Area Chilled Water  
Pump (NOTF 20222457)  
NCV 05000534/2007003-02, Failure to perform a Risk Assessment When Required By 10 CFR  
50.65(a)(4) (NOTF 20335275)  
NCV 05000354/2007004-01, Failure to Identify Degraded RCIC Flow Controller at the Remote  
Shutdown Panel (NOTF 20344871)

- NCV 05000354/2007004-02, Inadequate Operating Procedure for the Service Water Strainers (NOTF 20324756)
- NCV 05000354/2007004-03, Foreign Material Results in Unavailability of 'D' Service Water Train (NOTF 20333820)
- NCV 05000354/2007005-01, Inadequate Risk Assessment for Maintenance on a Watertight Door (NOTF 20357972)
- NCV 05000354/2007005-02, Inadequate Design Control of Safety Relief Valve Discharge Piping (NOTF 20358409)
- NCV 05000354/2007005-03, Reactor Water Level Transient Due to DFCS Troubleshooting (NOFT 20358396)
- NCV 05000354/2007005-04, Technical Support Center Loss of Power Without Compensatory Action (NOTF 20358437)
- NCV 05000354/2007005-05, Inadvertent Loss of RCS Inventory due to Loss of Configuration Control, (NOTF 20358443)
- NCV 05000354/2007005-06, Inadvertent Loss of RCS Inventory due to Inadequate Test Procedure (NOTF 20343032)
- NCV 05000354/2007005-07, Inadequate Radiation Survey of HRA (NOTF 20358454)
- NCV 05000354/2007005-09, Failure To Promptly Identify and Correct Inter Granular Stress Corrosion Cracking in Dissimilar Metal Welds in Reactor Vessel Nozzle N2A (NOTF 20358511)
- NCV 05000354/2007006-02, ABB 4kV HK Circuit Breaker For 'D' Vital Bus Failed Due To Hardened Grease. (NOFT 20330712)
- NCV 05000354/2007006-03, 'B' Control Room Emergency Filtration Failure Due To Damper Controlled Power Supply Failure (NOTF 20326624)
- NCV 05000354/2008002-01, Improper Management of Working Hours During Refueling Outage (NOTF 2038909)
- NCV 05000354/2008003-01, Inadequate Corrective Actions for Traveling Water Screen Support Structure (NOTFs 20370390, 20370435, & 20371775)
- NCV 05000354/2008004-01, Inadvertent Feedwater Injection Through the High Pressure Coolant Injection System Due to an Inadequate Test Procedure (NOTF 20391541)

Miscellaneous

- 10CFR50.59 Screen for HC.OP-ST.KJ-0001, dated 3/5/02
- Calculation 19-18, Maximum Flood Levels in Control/Diesel Generator Areas, Rev. 4
- Calculation H1-ZZ-MDC-1880, Post LOCA, EAB, LPZ, and CR Doses, Rev. 2
- Daily Orders, dated 8/8/08 – 1/3/09
- Design Change Package 80095554
- EEE Std 387-1995, IEEE Standard Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations, dated 9/26/07
- Emergency Diesel Generator AG400 Operability Test – Monthly 10CFR50.59 Screen, dated 3/5/02
- Exelon Template for Power Supplies
- FCI Standard #89-1, Guide for the Selection, Installation and Maintenance of Pipe Line Strainers, Rev. 6
- H08.01.99, Operation & Maintenance Manual Emergency Diesel Generator System, dated 10/25/96
- HC.OP-DL.ZZ-0004 Attachment 1, Log 4 Reactor Building Data Log, dated 3/12/08, 8/20/08, and 11/26/08
- HC.OP-DL.ZZ-0006 Attachment 1, Log 6 Auxiliary Building Data Log, dated 3/12/08,

8/20/08, and 11/26/08  
HC.OP-DL.ZZ-0007 Attachment 1, Log 7 Yard Data Log, dated 3/12/08, 8/20/08, and 11/26/08  
HCGS PRA Risk Evaluation Form for work Week 0903  
Hope Creek 2009 Reliability Index, dated January 2009  
Hope Creek Control Room Distractions Report, dated 12/10/08  
Hope Creek Control Room Narrative Log, dated 8/3-9/08 & 11/16-22/08  
Hope Creek Document Number 4228291 Untagging Work List for AB800B MN STM PLUGS  
FOR MSL WORK R15  
Hope Creek Facility Operating License Licensee No NPF-57 Amendments No 156, and 174  
Hope Creek Operability Determination Report, dated 12/15/08  
Hope Creek Operator Burdens, dated 12/5/08  
Hope Creek Operator Work Arounds / Challenges, dated 12/5/08  
Hope Creek Temporary Modification Summary Log, dated 12/15/08  
Maintenance 2008 Excellence Plan, dated 1/13/09  
Maintenance Plan HC10076, HC.IC.FT-SN-009 ADS/Safety Relief VLV ST  
Maintenance Rule A1 System Review, dated 12/15/08  
NRC Regulatory Guide 1.9, Application and Testing of Safety-Related Diesel generators in  
Nuclear Power Plants, March 2007  
PM018Q-0499(003), Instructions for Installing and Operating Nugent Strainers and Filters  
PSEG PCM Template for Circuit Cards – GE NUMAC Systems  
SC-KJ-0149, Diesel Generator 'D' Lube Oil Filter Differential Press. High, Revision 2  
Standing Orders Master Log, dated 1/14/09  
WCD 4228291 & 4236750

**LIST OF ACRONYMS**

ACE	apparent cause evaluation
ADAMS	Agency-wide Documents Access and Management System
CACW	Control Area Chilled Water
CAP	corrective action program
CCAs	common cause analyses
CFR	Code of Federal Regulations
D/P	differential pressure
Delta CDF	Change in Core Damage Frequency
EACE	equipment apparent cause evaluation
ECP	employee concerns program
EDG	emergency diesel generator
EMIS	equipment malfunction information system
EP	emergency preparedness
FASA	focused area self assessment
FCI	The Flow Control Institute
FIN	fix it now
GL	Generic Letter
IMC	Inspection Manual Chapter
IN	Information Notice
HPCI	High Pressure Coolant Injection
Hope Creek	Hope Creek Generating Station
KW	kilowatt
LO	lube oil
LOP/LOCA	loss of offsite power/loss of coolant accident
MRC	management review committee
NCV	non-cited violation
NOTF	notification
NRC	Nuclear Regulatory Commission
OAR	open area ratio
OE	operating experience
PARS	publicly available records system
PI&R	problem identification and resolution
POD	plan of the day
PRA	Probabilistic Risk Assessment
PSEG	Public Service Enterprise Group Nuclear, LLC
RCE	root cause evaluation
RCIC	reactor core isolation cooling
RHR	residual heat removal
SACS	safety auxiliaries cooling system
SCWE	safety conscious work environment
SDP	significance determination process
SOC	station ownership committee
SPAR	Simplified Plant Analysis Risk Model
SRO	senior reactor operator
SRV	safety relief valve
ST	surveillance test
SW	service water

TS	technical specification
UFSAR	Updated Final Safety Analysis Report
WCD	work clearance document