



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

May 5, 2010

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

SUBJECT: HOPE CREEK GENERATING STATION - NRC INTEGRATED INSPECTION  
REPORT 05000354/2010002

Dear Mr. Joyce:

On March 31, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at the Hope Creek Generating Station. The enclosed inspection report documents the inspection results discussed on April 9, 2010, with Mr. Perry and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The report documents one NRC-identified finding and one self-revealing finding of very low safety significance (Green). These findings were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they were entered into your corrective action program (CAP), 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 any NCV in this report, 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 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. The information you provide will be considered in accordance with Inspection Manual Chapter (IMC) 0305.

In accordance with Title 10 of the Code of Federal Regulations (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

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Sincerely,

A handwritten signature in black ink, appearing to read 'Arthur L. Burritt', with a long horizontal flourish extending to the right.

Arthur L. Burritt, Chief  
Projects Branch 3  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000354/2010002  
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Sincerely,

/RA/

Arthur L. Burritt, Chief  
Projects Branch 3  
Division of Reactor Projects

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## U.S. NUCLEAR REGULATORY COMMISSION

## REGION I

Docket No: 50-354

License No: NPF-57

Report No: 05000354/2010002

Licensee: PSEG Nuclear LLC (PSEG)

Facility: Hope Creek Generating Station

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

Dates: January 1, 2010 through March 31, 2010

Inspectors: B. Welling, Senior Resident Inspector  
A. Patel, Resident Inspector  
C. Bickett, Senior Project Engineer  
F. Bower, Senior Resident Inspector, Peach Bottom  
J. Furia, Senior Health Physicist  
T. O'Hara, Reactor Inspector  
J. Richmond, Senior Reactor Inspector  
J. Schoppy, Senior Reactor Inspector

Approved By: Arthur L. Burritt, Chief  
Projects Branch 3  
Division of Reactor Projects

Enclosure

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## SUMMARY OF FINDINGS

IR 05000354/2010002; 01/01/2010 - 03/31/2010; Hope Creek Generating Station; Maintenance Effectiveness, Operability Evaluations.

This report covers a three-month period of inspection by resident inspectors and announced inspections by regional specialist inspectors. Two Green non-cited violations (NCVs) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) and determined using IMC 0609, "Significance Determination Process" (SDP). The cross-cutting aspect of a finding is determined using the guidance in IMC 0305, "Operating Reactor Assessment Program." Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. 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.

### Cornerstone: Mitigating Systems

- Green. A self-revealing NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," was identified because the B control room chiller tripped when it was started on November 18, 2009. This reduced the cooling capability of the control area chilled water system. The inspectors determined that the cause of the trip was that PSEG did not identify and correct a condition adverse to quality associated with a safety-related breaker for the B control room chiller. Specifically, PSEG did not identify a loose wiring connection on the breaker during preventive maintenance inspections following refurbishment by a vendor. PSEG's corrective actions included repair of the affected breaker, inspections of other breakers, and a revision to a preventive maintenance procedure. The violation was entered into the corrective action program as notification 20441285.

The finding was more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone. The loose wiring connection affected the reliability and availability of the B control room chiller, which provides cooling for the main control room, emergency switchgear rooms, and the safety auxiliaries cooling system pump rooms. The inspectors performed a Phase I screening of the finding using IMC 0609, Attachment 0609.04, Table 4a, Mitigating Systems cornerstone. The inspectors determined the issue was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not result in an actual loss of safety function because the A chiller was available, and was not potentially risk significant for external events. The finding had a cross-cutting aspect in the area of human performance, because PSEG's breaker preventive maintenance procedure was not complete, accurate, and up-to-date. Specifically, the procedure did not include steps to check for loose wiring connections on key components. (H.2(c)) (Section 1R12)

- Green. The inspectors identified a NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," because PSEG failed to identify and correct a condition adverse to quality. Specifically, PSEG did not identify that the high pressure coolant injection (HPCI) booster pump outboard bearing housing oil level was below the minimum level mark, and the housing was actively leaking. Corrective actions performed by PSEG included restoring the proper oil level, repairing the leak, conducting training for

equipment operators, and performing observations of equipment operator rounds. The violation was entered into the corrective action program as notification 20444949.

The inspectors determined that not identifying a condition adverse to quality, the lowering oil level in the HPCI booster pump outboard bearing that could have prevented the HPCI system from performing its safety function, was a performance deficiency. The performance deficiency was more than minor because, if left uncorrected, the condition adverse to quality would lead to a more significant safety concern. The inspectors performed a Phase I screening of the finding using IMC 0609, Attachment 0609.04, Table 4a, Mitigating Systems cornerstone. The inspectors determined the issue was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not result in an actual loss of safety function, and was not potentially risk significant for external events. The finding had a cross-cutting aspect in the area of problem identification and resolution (PI&R), because PSEG did not identify the HPCI booster pump bearing low oil level condition and leak completely, accurately, and in a timely manner commensurate with its safety significance. (P.1(a)) (Section 1R15)

## REPORT DETAILS

### Summary of Plant Status

The Hope Creek Generating Station (HCGS) operated at or near full power for the duration of the inspection period with the following exceptions. On January 13, operators reduced power to approximately 90 percent in response to a trip of the 5B feedwater heater. The unit was restored to full power on the same day. On January 15, the unit was taken offline for a planned maintenance outage. The unit was restored to full power on January 21. On February 12, operators reduced power to approximately 80 percent power due to a trip of the 1B, 2B, and 3B feedwater heaters. The unit was restored to full power on February 13. On February 26, the A reactor recirculation pump tripped, resulting in an initial power reduction to about 70 percent. Operators reduced power further to approximately 40 percent to recover the A recirculation pump. The unit was restored to full power on February 28.

#### 1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness

##### 1R01 Adverse Weather Protection (71111.01 - 1 sample)

##### .1 Evaluate Readiness for Impending Adverse Weather Conditions

##### a. Inspection Scope

The inspectors completed one adverse weather protection sample. The inspectors reviewed PSEG's preparation activities for river grass intrusion conditions that may impact the station service water system. Inspectors assessed implementation of PSEG's grassing readiness plan through service water system walkdowns, corrective action program (CAP) review, and discussions with cognizant managers and engineers. The documents reviewed are listed in the Attachment.

##### b. Findings

No findings of significance were identified.

##### 1R04 Equipment Alignment

##### .1 Partial Walkdown (71111.04Q - 3 samples)

##### a. Inspection Scope

The inspectors completed three partial walkdown inspection samples. The inspectors performed partial system walkdowns for the three systems listed below to verify the operability of redundant or diverse trains and components when safety equipment was unavailable. The inspectors completed walkdowns to determine whether there were discrepancies in the system's alignment that could impact the function of the system, and therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, walked down system components, and verified that selected breakers,

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valves, and support equipment were in the correct position to support system operation. The inspectors also verified that PSEG had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP. The documents reviewed are listed in the Attachment.

- A, C, and D emergency diesel generators (EDGs) with the B EDG out-of-service for planned maintenance on January 22
- A residual heat removal (RHR) system with the B and D RHR system out-of-service for planned maintenance on February 17
- A control room emergency filtration (CREF) system with the B CREF system out-of-service for planned maintenance on March 15

b. Findings

No findings of significance were identified.

.2 Complete Walkdown (71111.04S - 1 sample)

a. Inspection Scope

The inspectors performed one complete walkdown inspection of accessible portions of the HPCI system. The inspectors used PSEG procedures and other documents listed in the Attachment to verify proper system alignment and functional capability. The inspectors independently verified the alignment and status of HPCI system valves, labeling, hangers and supports, and associated support systems. The walkdown also included checks that oil reservoir levels were normal, pump rooms and pipe chases were adequately ventilated, system parameters were within established ranges, and equipment deficiencies were appropriately identified.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05Q - 6 samples)

.1 Fire Protection - Tours

a. Inspection Scope

The inspectors completed six quarterly fire protection inspection samples. 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 combustibles and ignition sources were controlled in accordance with PSEG's administrative procedures; fire detection and suppression equipment was available for use; that passive fire barriers were maintained in good material condition; and that compensatory measures for out of service, degraded, or inoperable fire protection equipment were implemented in accordance with PSEG's fire plan. The areas toured are listed below with their associated pre-fire plan designator. The documents reviewed are listed in the Attachment.

- FRH-II-433, A & C safety auxiliaries cooling system (SACS) room, 102' elevation
- FRH-II-432, B & D SACS room, 102' elevation
- FRH-II-461, standby liquid control system room, 162' elevation
- FRH-11-511, auxiliary building, 54' elevation
- FRH-11-413, C RHR room
- FRH-11-412, D RHR room

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06 - 1 sample)

a. Inspection Scope

The inspectors completed one flood protection measure inspection sample. The inspectors reviewed selected risk-important plant design features and PSEG procedures intended to protect the plant and its safety-related equipment from internal flooding events. Specifically, the inspectors focused on internal flood mitigation features for the 54' elevation of the reactor building, which contains significant portions of the core spray, RHR, HPCI, reactor core isolation cooling (RCIC), and reactor building sump systems. The inspectors reviewed flood analysis and design documents, including the updated final safety analysis report (UFSAR), engineering calculations, and abnormal operating procedures. The inspectors observed the condition of wall penetrations, watertight doors, flood alarm switches, and drains to assess their readiness to contain flow from an internal flood in accordance with the design basis. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11Q - 1 sample)

Requalification Activities Review by Resident Staff

a. Inspection Scope

The inspectors completed one quarterly licensed operator requalification program inspection sample. The inspectors observed a licensed operator annual requalification simulator scenario (SG-664) on February 16, 2010, to assess operator performance and training effectiveness. The scenario involved a recirculation system pump trip, followed by a manual reactor scram and turbine trip. These events were further complicated by the simulated failure of the reactor to shutdown due to a malfunction of the rod control system. The inspectors assessed simulator fidelity and observed the simulator instructors' critique of operator performance. The inspectors also observed control room activities with emphasis on simulator identified areas for improvement. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q - 2 samples)

a. Inspection Scope

The inspectors completed two maintenance effectiveness inspection samples. For the two performance issues listed below, the inspectors evaluated items such as: appropriate work practices; identifying and addressing common cause failures; scoping in accordance with 10 CFR 50.65(b) of the Maintenance Rule; characterizing reliability issues for performance; trending key parameters for condition monitoring; charging unavailability for performance; classification and reclassification in accordance with 10 CFR 50.65(a)(1) or (a)(2); and appropriateness of performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSCs/functions classified as (a)(1). The documents reviewed are listed in the Attachment.

- B control room chiller trip
- B EDG alternating current transfer relay failure

b. Findings

Introduction: A Green, self-revealing NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," was identified because the B control room chiller tripped when it was started on November 18, 2009. This reduced the cooling capability of the control area chilled water system. The inspectors determined that the cause of the trip was that PSEG did not identify and correct a condition adverse to quality associated with a safety-related breaker for the B control room chiller. Specifically, PSEG did not identify a loose wiring connection on the breaker during preventive maintenance inspections following refurbishment by a vendor.

Description: On November 18, 2009, the 4 kV breaker for the B control room chiller tripped during a routine starting evolution. The control room chiller was declared inoperable and unavailable. PSEG's troubleshooting revealed there was a loose wiring connection on a breaker control device. The loss of continuity associated with this loose connection caused a device called the breaker malfunction module to trip the breaker.

The B control room chiller is part of the safety-related control area chilled water system, which maintains satisfactory ambient air temperatures for the main control room, emergency switchgear rooms, and the safety auxiliaries cooling system pump rooms.

PSEG noted that the breaker was recently refurbished by a vendor. The breaker was installed on October 20, 2009, and satisfactorily passed a post-maintenance test. The B control room chiller ran satisfactorily until November 3, when it was secured for a routine swap of the control room chillers. The breaker tripped during the next B control room chiller start on November 18. Based on the intermittent nature of the loose wiring connection, PSEG concluded that the exact time of the failure could not be definitively determined.

PSEG performed an apparent cause evaluation that identified a deficiency in the breaker preventive maintenance procedure, HC.MD-PM.PB-0001, "4.16 Breaker Cleaning and P.M." The procedure did not include steps to inspect for loose connections. PSEG determined that if the inspection steps had been present in the preventive maintenance procedure when the breaker was prepared for installation, then the loose connection would have been identified and repaired. The apparent cause evaluation also noted that other similar breaker preventive maintenance procedures included steps to inspect for loose connections. Thus, procedure HC.MD-PM.PB-0001 was not consistent with the standard established in similar PSEG preventive maintenance procedures. Additionally, PSEG completed a Maintenance Rule evaluation of the chiller trip and concluded that it was a maintenance preventable functional failure.

PSEG's corrective actions included replacement and repair of the affected breaker, extent-of-condition inspections on the three other breakers with malfunction modules, and a revision to the preventive maintenance procedure to include verification that wiring connections for key components are tight.

The inspectors concluded that PSEG's evaluations and corrective actions were adequate.

Analysis: The inspectors determined that the performance deficiency that resulted in the reduction of cooling capability for the control area chilled water system was that PSEG did not identify a condition adverse to quality associated with the B control room chiller. Specifically, PSEG did not identify a loose wiring connection on the B control room chiller breaker, which led to a trip of the breaker during a routine start. The finding was more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone. The loose wiring connection affected the reliability and availability of the B control room chiller, which provides cooling for the main control room, emergency switchgear rooms, and the safety auxiliaries cooling system pump rooms. The inspectors performed a Phase I screening of the finding using IMC 0609, Attachment 0609.04, Table 4a, Mitigating Systems cornerstone. The inspectors determined the issue was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not result in an actual loss of safety function because the A chiller was available, and was not potentially risk significant for external events.

The finding had a cross-cutting aspect in the area of human performance, because PSEG's breaker preventive maintenance procedure was not complete, accurate, and up-to-date. Specifically, the procedure did not include steps to check for loose wiring connections on key components. (H.2(c))

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," 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, on or about October 20, 2009, PSEG failed to identify and correct a loose wiring connection on the breaker for the B control room chiller. Subsequently, the breaker tripped when operators attempted to start the chiller on November 18, 2009. However, because the finding was of very low safety significance and has been entered into the CAP as notification 20441285, this violation is being treated as a NCV,

consistent with section VI.A of the NRC Enforcement Policy. (NCV 05000354/2010-002-01, Control Room Chiller Trip)

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 - 5 samples)

a. Inspection Scope

The inspectors completed five maintenance risk assessment and emergent work control inspection samples. The inspectors reviewed on-line risk management evaluations through direct observation and document reviews for the following five plant configurations.

- B EDG planned maintenance and B channel relays preventive maintenance during a D channel work week on January 22
- A1 SACS heat exchanger valve and SACS pump maintenance work on January 27
- A CREF maintenance work February 1 through 5
- B EDG and D circulating water pump on February 12
- B and D RHR system planned maintenance on February 17

The inspectors reviewed the applicable risk evaluations, work schedules and control room logs for these configurations to verify that concurrent planned and emergent maintenance and test activities did not adversely affect the plant risk already incurred with these configurations. PSEG's risk management actions were reviewed during shift turnover meetings, control room tours, and plant walkdowns. The inspectors also used PSEG's on-line risk monitor (Equipment Out-of-Service workstation) to gain insights into the risk associated with these plant configurations. Finally, the inspectors reviewed notifications documenting problems associated with risk assessments and emergent work evaluations. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15 - 5 samples)

a. Inspection Scope

The inspectors completed five operability evaluation inspection samples. The inspectors reviewed the operability determinations for the following degraded or non-conforming conditions:

- RCIC trip throttle valve packing leak;
- C EDG low generator field current;
- HPCI operation with degraded HPCI room coolers;
- HPCI booster pump low bearing oil level condition; and
- D EDG low keepwarm temperature and degraded keepwarm heater operation.

The inspectors reviewed the technical adequacy of the operability determinations to ensure the conclusions were justified. The inspectors also walked down accessible equipment to corroborate the adequacy of PSEG's operability determinations.

Additionally, the inspectors reviewed other PSEG identified safety-related equipment deficiencies during this report period and assessed the adequacy of their operability screenings. The documents reviewed are listed in the Attachment.

b. Findings

Introduction: The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," because PSEG failed to identify and correct a condition adverse to quality. Specifically, PSEG did not identify that the HPCI booster pump outboard bearing housing oil level was below the minimum level mark, and the housing was actively leaking.

Description: During a plant walkdown on December 22, 2009, the inspectors observed the HPCI booster pump outboard bearing oil level in the sight glass was below the minimum level mark, and there was an active, minor leak. In response to this observation, PSEG operations personnel reestablished the proper oil level and initiated plans to repair the leak. The inspectors noted that PSEG had not previously identified the low oil level or leak in the CAP.

Non-licensed nuclear equipment operators monitor the HPCI system oil levels during rounds via the Reactor Building Log, HC.OP-DL.ZZ-0004, which is performed on day and night shifts. The equipment operators must verify in the log that there are "no oil/water leaks and proper oil levels." The inspectors reviewed the last recorded log entry, performed during the night shift on December 21, which stated that the HPCI system oil condition was satisfactory.

PSEG performed an engineering technical evaluation to determine the effect of the as-found low bearing oil level on HPCI operability. This analysis concluded that the HPCI system would have performed its design function for a 24-hour mission time given the as-found oil level and the measured leakage rate. However, the inspectors also determined that because the oil was leaking from the threaded connection for the bearing housing sightglass, which was below the minimum level for adequate lubrication for the bearing, had the leakage continued to go undetected and was not corrected, the bearing would have eventually not had sufficient lubrication.

The inspectors determined that the low bearing oil level and the minor oil leak identified on the HPCI booster pump outboard bearing were conditions adverse to quality. Lowering oil level in the HPCI booster pump outboard bearing could have ultimately resulted in insufficient lubrication for that bearing that would have prevented the HPCI system from performing its safety function.

PSEG performed a common cause evaluation that examined several equipment deficiencies identified by external organizations and concluded that the common cause was inattention to detail during the performance of building rounds. Additionally, PSEG management stated that standards for equipment operator rounds needed to be improved.

Additional corrective actions performed by PSEG for this issue included the following:

- Conducting a stand-down for operations personnel to discuss the issue and impact;
- Taking photos of all safety-related equipment oil levels to determine extent-of-condition;
- Performing observations of operator rounds by operations management;
- Conducting training for nuclear equipment operators; and
- Completing repairs of the oil leak.

The inspectors concluded that these corrective actions were appropriate.

However, the inspectors also identified an additional causal aspect, in that the operators' standard for a satisfactory booster pump bearing oil level was unclear, based on two points. First, a nuclear equipment operator stated that some of his fellow operators believed that it was acceptable for the oil level to be visible within the sightglass, instead of between the minimum and maximum level marks. This would have allowed the oil level to be substantially lower than the as-found condition. Secondly, the inspectors noted that the reactor building log did not specifically state that the HPCI booster pump bearing oil level was to be verified between the minimum and maximum level marks.

Analysis: The inspectors determined that not identifying a condition adverse to quality, the lowering oil level in the HPCI booster pump outboard bearing that could have prevented the HPCI system from performing its safety function, was a performance deficiency. The performance deficiency was more than minor because, as stated above, if left uncorrected, the condition adverse to quality would lead to a more significant safety concern. The inspectors performed a Phase I screening of the finding using IMC 0609, Attachment 0609.04, Table 4a, Mitigating Systems cornerstone. The inspectors determined the issue was of very low safety significance (Green) because the finding was not a design or qualification deficiency, did not result in an actual loss of safety function, and was not potentially risk significant for external events.

The finding had a cross-cutting aspect in the area of problem identification and resolution (PI&R), because PSEG did not identify the HPCI booster pump bearing low oil level condition and leak completely, accurately, and in a timely manner commensurate with its safety significance. (P.1(a))

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, "Corrective Actions," 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, PSEG failed to identify and correct a low out-of-specification oil level and an active oil leak on the HPCI booster pump outboard bearing, prior to the inspectors identifying this condition on December 22, 2009. However, because the finding was of very low safety significance and has been entered into the CAP as notifications 20442190 and 20444949, this violation is being treated as a NCV, consistent with section VI.A of the NRC Enforcement Policy. **(NCV 05000354/2010-002-02, HPCI Booster Pump Outboard Bearing Low Oil Level and Leak)**

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1R18 Plant Modifications (71111.18 - 2 samples).1 Temporary Modificationa. Inspection Scope

The inspectors completed a review of one temporary plant modification package (10-005) that defeated the output from a failed level transmitter (LT-1559B) to eliminate inadvertent high and high-high level trips of the associated 5B feedwater heater. PSEG's troubleshooting had determined that the output from transmitter, LT-1559B, was inaccurate and had led to a trip of the 5B feedwater heater and an approximately 10 percent power reduction on January 13, 2010. Although the condensate and feedwater heater level control systems are not safety-related, another trip of the 5B feedwater heater could lead to an additional unplanned plant transient. The inspectors verified that the design bases, licensing bases, and performance capability of the condensate and feedwater heating systems were not degraded by this temporary modification. The inspectors verified the post-modification testing was adequate to ensure the SSCs would function properly. The 10 CFR 50.59 evaluation associated with this temporary modification was also reviewed. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

.2 Permanent Modificationa. Inspection Scope

The inspectors completed a review of one permanent plant modification package for the replacement of the A CREF temperature sensor and controller. This review verified that the design bases, licensing bases, and performance capability of the system were not degraded by the modification. The inspectors verified the new configuration was accurately reflected in the design documentation, and the post-modification testing was adequate to ensure the SSCs would function properly. The inspectors interviewed plant staff, and reviewed issues that had been entered into the CAP to determine whether PSEG had been effective in identifying and resolving problems associated with plant modifications. The 10 CFR 50.59 evaluation associated with this modification was also reviewed. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19 - 6 samples)a. Inspection Scope

The inspectors completed six post-maintenance testing inspection samples. The inspectors reviewed the post-maintenance tests for the maintenance items listed below to verify that procedures and test activities ensured system operability and functional capability following completion of maintenance. The inspectors reviewed applicable test

procedures to verify that they tested all safety functions potentially affected by the associated maintenance activities. The inspectors verified that for each potentially affected safety function the acceptance criteria stated in the procedure was consistent with the UFSAR and other design documentation. The inspectors also witnessed completion of the testing or reviewed the completed test results to verify satisfactory restoration of all safety functions affected by the maintenance activities. The documents reviewed are listed in the Attachment.

- HPCI booster pump bearing oil sight glass replacement on January 20
- C EDG planned maintenance on March 1
- Control rod 30-07 hydraulic control unit corrective maintenance on January 20
- A CREF replacement of 1AK400 chiller bearing oil and refrigerant discharge temperature switches on February 4
- A EDG planned maintenance on February 24
- D EDG unplanned maintenance on the keepwarm heater on March 29

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activities (71111.20 - 1 sample)

a. Inspection Scope

PSEG conducted a planned maintenance outage from January 15 through January 21 to repair the A circulating water pump discharge valve, to replace the M safety-relief valve pilot valve, and to perform other planned maintenance activities. During the outage, the inspectors monitored or observed the activities listed below to verify PSEG controls over the outage activities. The documents reviewed are listed in the Attachment.

- Portions of the shutdown and cooldown processes
- Initial and final closeout walkdown of selected drywell areas to check for unidentified leakage or other discrepant conditions
- Outage risk management
- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable Technical Specification (TS) when taking equipment out of service
- Decay heat removal operations
- Reactor water inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss
- Status and configuration of electrical systems and switchyard activities to ensure that TSs were met
- Activities that could affect reactivity
- Reactor start-up, including reactor criticality
- Personnel fatigue management controls

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22 - 6 samples)a. Inspection Scope

The inspectors completed six surveillance testing (ST) inspection samples. The inspectors witnessed performance of and/or reviewed test data for the risk-significant STs listed below to assess whether the SSCs tested satisfied TS, UFSAR, and procedure requirements. The inspectors verified that test acceptance criteria were clear, demonstrated operational readiness and were consistent with design documentation; that test instrumentation had current calibrations and the range and accuracy for the application; and that tests were performed, as written, with applicable prerequisites satisfied. Upon ST completion, the inspectors verified that equipment was returned to the status specified to perform its safety function. The documents reviewed are listed in the Attachment.

- HPCI inservice test on January 5
- SACS Loop A HX isolation valve EG-HV-2491A test on January 28
- C EDG monthly ST on February 1
- C RHR 2-year comprehensive test on March 3
- C SW 2-year comprehensive test on March 2
- D RHR full flow inservice test valve on February 17

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06 - 1 sample)a. Inspection Scope

The inspectors completed one drill evaluation inspection sample. The inspectors observed emergency plan response actions at the simulated control room and the technical support center during an emergency preparedness drill on January 29, 2010. The inspectors verified that emergency classification declarations and notifications were completed in accordance with 10 CFR 50.72, 10 CFR 50, Appendix E, and the Hope Creek emergency plan implementing procedures. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

## 2. RADIATION SAFETY

Cornerstone: Radiation Safety – Public and Occupational

### 2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

#### a. Inspection Scope

The inspectors reviewed any changes to plant operations that may result in a significant new radiological hazard for onsite workers or members of the public. The inspectors verified PSEG had assessed the potential impact of these changes and implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard.

The inspectors reviewed a sample of two completed radiological surveys of selected plant areas. The inspectors verified that the thoroughness and frequency of the surveys were appropriate given radiological hazard.

The inspectors conducted walk-downs of the plant that included radioactive waste processing, storage, and handling areas to evaluate material conditions and potential radiological conditions.

The inspectors reviewed radiologically risk-significant work activities that involved exposure to radiation. The inspectors verified that appropriate pre-work surveys were performed which established adequate protective measures. The inspectors also reviewed PSEG's radiological survey program to determine if hazards were properly identified.

The inspectors reviewed air sample survey records and verified that samples were collected and counted in accordance with PSEG procedures. The inspectors observed work in potential airborne areas, and verified that air samples were representative of the breathing air zone. The inspectors verified the adequacy of PSEG's program for monitoring levels of loose surface contamination.

The inspectors verified that selected containers holding nonexempt licensed radioactive materials which may cause unplanned or inadvertent exposure of workers were properly labeled and controlled.

The inspectors reviewed radiation work permits (RWPs) used to access high radiation areas. The inspectors verified the RWPs included allowable stay times and/or permissible dose for radiologically significant work. The inspectors verified that electronic personal dosimeter alarm set points were in accordance with survey indications and PSEG's procedures.

The inspectors also verified PSEG was appropriately entering issues into the CAP. The inspectors evaluated PSEG performance against the requirements contained in 10 CFR 20.1601, TS 6.12, and UFSAR Chapter 12. The documents reviewed are listed in the Attachment.

#### b. Findings

No findings of significance were identified.

Enclosure

2RS2 Occupational As Low As Reasonably Achievable (ALARA) Planning and Controls  
(71124.02)

a. Inspection Scope

The inspectors reviewed PSEG's collective exposure history, current exposure trends, and ongoing or planned activities to assess current performance and exposure challenges. The inspectors reviewed PSEG's 3-year rolling average collective exposure data. The inspectors also assessed the site-specific trends in collective exposures and source term measurements.

The inspectors compared the results achieved (dose rate reductions, person-rem used) with the intended dose established in PSEG's ALARA planning for these work activities. The inspectors reviewed the integration of ALARA requirements into work procedure and RWP documents. The inspectors compared the person-hour estimates provided by maintenance planning and other groups to the radiation protection group with the actual work activity time requirements and evaluated the accuracy of these time estimates. The inspectors evaluated PSEG performance against the requirements contained in 10 CFR 20.1101 and UFSAR Section 12.1. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

2RS4 Occupational Dose Assessment (71124.04)

a. Inspection Scope

The inspectors reviewed PSEG's radiation protection program audits related to internal and external dosimetry.

The inspectors reviewed PSEG's procedures associated with dosimetry operations, including issuance/use of external dosimetry, assessment of internal dose, and evaluation of and dose assessment for radiological incidents.

The inspectors verified that PSEG had established procedural requirements for determining when external and internal dosimetry was required.

The inspectors reviewed the most recent National Voluntary Laboratory Accreditation Program (NVLAP) accreditation report which reviews dosimetry provided by vendors.

The inspectors verified that required PSEG's personnel dosimeters were NVLAP accredited. The inspectors reviewed the vendor's NVLAP accreditation program. The inspectors verified that the approved irradiation test categories for each type of personnel dosimeter used were consistent with the types and energies of the radiation present.

The inspectors evaluated the onsite storage of dosimeters before their issuance, during use, and before processing/reading, and the guidance provided to radiation workers with respect to care and storage of dosimeters.

The inspectors reviewed notifications related to failed electronic dosimeters. The inspectors determined that PSEG had not identified trends in this area and had implemented appropriate corrective actions for each individual issue.

The inspectors reviewed procedures used to assess dose from internally deposited nuclides using whole body counting equipment. The inspectors verified that the procedures addressed methods for determining if an individual was internally or externally contaminated, the release of contaminated individuals, entry route determination, and dose assignment.

The inspectors verified that the frequency of such measurements was consistent with the biological half-life of the potential nuclides available for intake.

The inspectors reviewed the minimum detectable activity (MDA) of the instrument. The inspectors determined that the MDA was adequate to determine the potential for internally deposited radionuclides sufficient to prompt additional investigation.

The inspectors verified that the system used in each bioassay had sufficient counting time and low background to ensure appropriate sensitivity for the potential radionuclides of interest. The inspectors verified that the appropriate nuclide library was used. The inspectors verified that any anomalous count peaks/nuclides indicated in each output spectra were reviewed by PSEG.

The inspectors selected internal dose assessments obtained using in-vitro monitoring. The inspectors reviewed and assessed the adequacy of PSEG's program for in-vitro monitoring of radionuclides, including collection and storage of samples.

The inspectors reviewed the counting laboratory's quality assurance (QA) program. The inspectors verified that the lab participated in an analysis cross-check program and that out-of-tolerance results were identified and resolved appropriately.

The inspectors reviewed the adequacy of PSEG's program for dose assessments based on airborne/derived air concentration (DAC) monitoring. The inspectors verified that flow rates and/or collection times for fixed head air samplers or lapel breathing zone air samplers were adequate to ensure that appropriate lower limits of detection are obtained. The inspectors reviewed the adequacy of procedural guidance used to assess dose when PSEG applies protection factors. The inspectors reviewed dose assessments performed using airborne/DAC monitoring. The inspectors verified that the PSEG's DAC calculations were representative of the actual airborne radionuclide mixture.

The inspectors reviewed the adequacy of PSEG's internal dose assessments for any actual internal exposure greater than 10 millirem committed effective dose equivalent. The inspectors verified that the affected personnel were properly monitored with calibrated equipment the internal exposures were properly assessed in accordance with PSEG procedures.

The inspectors evaluated PSEG performance against the requirements contained in 10 CFR 20.1101 and UFSAR Section 12.1. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05)

a. Inspection Scope

The inspectors reviewed PSEG's program requirements contained in the Hope Creek Station Off-Site Dose Calculation Manual (ODCM). The inspectors reviewed calibration and maintenance of radiation monitoring equipment utilized in measuring plant effluents.

The inspectors walked down effluent radiation monitoring systems, including liquid and gaseous system. The inspectors verified that effluent/process monitor configurations align with ODCM descriptions.

The inspectors verified that channel calibration and functional tests were performed consistent with radiological effluent technical specifications (RETS)/ODCM. The inspectors verified that PSEG calibrated its monitors with National Institute of Standards and Technology traceable sources; primary calibrations adequately represented the plant nuclide mix; secondary calibration verified the primary calibration; and the channel calibrations encompass the instrument's alarm setpoints.

The inspectors verified that effluent monitor alarm setpoints were established as stated in the ODCM and station procedures. For changes to effluent monitor setpoints, the inspectors reviewed the basis for changes to ensure that an adequate justification exists.

The inspectors evaluated PSEG performance against the requirements contained in 10 CFR 20.1101 and UFSAR Section 12.1. The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06 - 1 sample)

a. Inspection Scope

The inspectors reviewed appropriate program documents, procedures, and evaluations from PSEG related to the radiological effluent controls program, including the following.

- Offsite Dose Calculation Manual (ODCM) revisions and associated technical justifications for ODCM changes
- New or applicable procedures for effluent programs (e.g., including ground water monitoring programs)
- Source terms and Part 61 analyses

- Evaluations of abnormal effluent discharges (leaks and spills)
- 10 CFR 50.59 reviews (e.g., system changes, advanced water chemistry methods)
- New entries into 10 CFR 50.75(g) files
- Corrective action program condition reports
- Licensee event reports, or special reports
- Self assessments and QA audits

The inspectors verified that each of the Radiological Effluents Controls Program requirements were implemented as described in Radiological Effluent Technical Specifications (RETS).

For each system modification, the inspectors reviewed changes to the liquid or gaseous radioactive waste system design, procedures, or operation as described in the UFSAR and plant procedures. The inspectors verified that any changes made to the liquid or gaseous waste systems were effective and maintained effluent releases to the public ALARA. No changes of this type occurred since the last inspection of this area.

The inspectors reviewed changes to the ODCM made by PSEG since the last inspection. The inspectors reviewed changes to ensure consistency was maintained with respect to guidance in NUREG-1301, 1302 and 0133, and Regulatory Guides 1.109, 1.21 and 4.1. No changes of this type occurred since the last inspection of this area.

For effluent monitoring instrumentation, the inspectors reviewed documentation to ensure adequate methods and monitoring of effluents. For changes to effluent radiation monitor set-point calculation methodology, the inspectors evaluated the basis for the changes to ensure an adequate justification.

The inspectors reviewed PSEG's program for identifying, assessing and controlling contaminated spills and leaks. For significant new effluent discharge pathways, the inspectors ensured the ODCM was updated to include the new pathway. The inspectors reviewed the Radiological Effluent Release Reports issued since the last inspection.

The inspectors verified that anomalous or unexpected results were identified by PSEG, entered into the CAP and adequately resolved.

For significant changes in reported dose values, the inspectors evaluated the factors that may have resulted in the change.

The inspectors reviewed the plant's correlation between the effluent release reports and the environmental monitoring results (see Section IV.B.2 of Appendix I to 10 CFR Part 50).

The inspectors reviewed the results of PSEG QA audits that verified compliance with the requirements of the RETS/ODCM.

The inspectors walked-down selected components of the gaseous and liquid discharge systems to include gas compressors, demineralizers and filters in use or standby, tanks, and vessels. The inspectors reviewed current system configuration with respect to the description in the UFSAR, temporary waste processing activities, system modifications

and the equipment material condition. For equipment or areas not readily accessible, the inspectors reviewed PSEG's material condition surveillance records.

The inspectors walked-down and review selected point of discharge effluent radiation monitoring systems and flow measurement devices. The inspectors reviewed effluent radiation monitor alarm set point values to verify agreement with RETS/ODCM requirements.

The inspectors observed selected portions of the routine processing and discharge of radioactive gaseous effluent including sample collection and analysis. The inspectors verified that appropriate treatment equipment is used and that the radioactive gaseous effluent was processed and discharged in accordance with RETS/ODCM requirements.

The inspectors reviewed several radioactive gaseous effluent discharge permits, including projected doses to members of the public.

The inspectors observed the routine processing and discharge of effluents including sample collection and analysis. The inspectors verified that appropriate effluent treatment equipment is used and that radioactive liquid waste was processed and discharged in accordance with procedure requirements. The inspectors observed the sampling and compositing of liquid effluent samples. The inspectors reviewed several radioactive liquid waste discharge permits, including projected doses to members of the public.

The inspectors reviewed a sample of effluent discharges made with inoperable effluent radiation monitors. The inspectors determined if appropriate compensatory sampling and radiological analyses were conducted at the required frequency specified in the RETS/ODCM. For compensatory sampling methods, the inspectors verified that representative samples were obtained. The inspectors also evaluated whether the facility was routinely relying on the use of compensatory sampling in lieu of adequate system maintenance or calibration. No events of this type occurred since the last inspection of this area.

The inspectors reviewed surveillance test results on non-safety related ventilation and gaseous discharge systems both HEPA and charcoal filtration. The inspectors ensured that the system was operating within acceptance criteria. The inspectors also reviewed the methodology PSEG used to determine the stack and vent flow issue rates and verified that the flow rates were consistent with RETS/ODCM or UFSAR values.

The inspectors verified that PSEG had identified contaminated non-radioactive systems. The inspectors ensured that 10 CFR 50.59 evaluations were performed per Inspection and Enforcement Bulletin 80-10. The inspectors verified that for newly contaminated systems with unmonitored effluent discharge paths to the environment, PSEG completed ODCM revisions to incorporate the new pathways and reported the effluents in accordance with Regulatory Guide 1.21. No events of this type occurred since the last inspection of this area.

The inspectors reviewed instrument maintenance and calibration records for both installed and counting room effluent monitoring equipment. The inspectors reviewed quality control records for the radiation measurement instruments.

The inspectors evaluated the methods used to determine the isotopes included in the source term to ensure all applicable radionuclides were included and within detectability

standards. The inspectors also reviewed the Part 61 analyses to ensure hard-to-detect radionuclides were included in the source term.

The inspectors reviewed the meteorological dispersion and deposition factors and hydrogeologic characteristics used in the ODCM and effluent dose calculations to ensure appropriate factors were being used for public dose calculations.

The inspectors reviewed the land-use census and verified that new public dose receptors or pathways were considered when performing member of the public dose assessments.

The inspectors reviewed a selection of monthly, quarterly, and annual dose calculations to ensure that PSEG properly demonstrated compliance with 10 CFR 50, Appendix I and TS dose criteria.

The inspectors verified that PSEG is continuing to implement the voluntary Nuclear Energy Institute/Industry Ground Water Protection Initiative (GPI). Since the last inspection, the inspectors: reviewed changes made to the GPI; reviewed monitoring results of the GPI; reviewed identified leakage or spill events and entries made into 10 CFR 50.75(g) records; reviewed evaluations of leaks or spills and any remediation actions taken for effectiveness, and verified voluntary reporting of leaks and spills to local and State authorities.

The inspectors reviewed the records of any abnormal gaseous or liquid tank discharges (e.g., discharges resulting from misaligned valves, valve leak-by, etc). The inspectors ensured the abnormal discharge was monitored by the discharge point effluent monitor. If abnormal discharges were made with inoperable effluent radiation monitors, the inspectors ensured that an evaluation was made of the discharge to account for the source term and projected doses to the public. The inspectors reviewed onsite contamination events involving contamination of ground water. The inspectors assessed whether the source of the leak or spill was identified and mitigated. For unmonitored spills, leaks, or unexpected liquid or gaseous discharges, the inspectors ensured that an evaluation was performed to determine the type and amount of radioactive material that was discharged. The inspectors assessed whether sufficient radiological surveys were performed to evaluate the extent of the contamination and the radiological source term. The inspectors also verified that a survey/evaluation was performed to include consideration of hard-to-detect radionuclides.

The inspectors evaluated analyses of any new or additional effluent discharge pathways as a result of a spill, leak, abnormal, or unexpected liquid discharge or gaseous discharges and verified that the ODCM was revised for significant, long term ground water discharges.

The inspectors verified that significant leaks and spills were properly documented in the site CAP and/or in the decommissioning file, per 10 CFR 50.75 (g).

The inspectors verified that dose assessments were performed for off-site members of the public that may have been exposed to abnormal effluent discharges.

The inspectors verified that PSEG completed required or voluntary offsite notifications for abnormal effluent discharges.

The inspectors verified that abnormal discharges were assessed and reported as part of the Annual Radiological Effluent Release Report per Reg. Guide 1.21. No events of this type occurred since the last inspection of this area.

The inspectors assessed evaluations of discharges from onsite surface water bodies (ponds, retention basins, lakes) that contain or potentially contain radioactivity, and the potential for ground water leakage from these onsite surface water bodies. The inspectors determined if licensees are properly accounting for discharges from these surface water bodies as part of their effluent release reports. No events of this type occurred since the last inspection of this area.

The inspectors reviewed routine groundwater monitoring results to assess whether PSEG was monitoring for unknown leakage. The inspectors verified that PSEG sufficiently evaluated the monitoring results, properly documented and reported the results, entered abnormal results into the CAP, and implemented adequate corrective actions.

The inspectors reviewed self assessments, audits, and licensee event reports that involved unanticipated offsite discharges of radioactive material. No events of this type occurred since the last inspection of this area.

The inspectors reviewed the results of the inter-laboratory comparison program to verify the quality of radioactive effluent sample analyses. The inspectors reviewed assessments of any identified bias in the sample analysis results and the overall effect on calculated projected doses to members of the public.

The inspectors verified that PSEG maintained adequate effluent sampling records, including sampling locations, sample analyses results, flow rates, and source term data for radioactive liquid and gaseous effluent. The inspectors verified that problems identified by PSEG through audits, self assessments, and monitoring results were entered into the corrective action program. The inspectors verified that PSEG implemented immediate and long term corrective actions to sufficiently address the causes for each identified issue.

The inspectors interviewed staff and reviewed documents to verify that follow-up activities were conducted in an effective and timely manner commensurate with their importance to safety and risk.

For repetitive deficiencies or significant individual deficiencies in problem identification and resolution, the inspectors verified that PSEG's self-assessment activities were also identifying and addressing these deficiencies. No events of this type occurred since the last inspection of this area.

The inspectors evaluated PSEG's performance against the requirements contained in: TS 6.8.1.i, 6.8.4.g, 6.9.1.7, 6.14; and 10 CFR 50.36a and 10 CFR 50, Appendix I, section IV.B.1 The documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

4. **OTHER ACTIVITIES**4OA1 Performance Indicator Verification (71151 - 3 samples)a. Inspection Scope

The inspectors reviewed PSEG's program for gathering, evaluating and reporting information for the performance indicators (PIs) listed below. The inspectors used the definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, to assess the accuracy of PSEG's collection and reporting of PI data. The documents reviewed are listed in the Attachment.

**Cornerstone: Initiating Events**

- Unplanned scrams per 7000 critical hours
- Unplanned scrams with complications
- Unplanned power changes per 7000 critical hours

The inspectors reviewed the data reported for these PIs for the period January 1 through December 31, 2009. The records reviewed included PI data summary reports, licensee event reports, monthly operating reports, and operator narrative logs. The inspectors verified the accuracy of the PIs and discussed the results with the system engineers responsible for data collection and evaluation.

b. Findings

No findings of significance were identified.

4OA2 Problem Identification and Resolution.1 Routine Review of Items Entered into the CAPa. Inspection Scope

As required by IP 71152, Identification and Resolution of Problems, and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of all items entered into PSEG's CAP. This was accomplished by reviewing the description of each new notification and attending management review committee meetings.

b. Findings

No findings of significance were identified.

.2 Annual Sample: Pump Vibration Monitoring Programa. Inspection Scope

The inspectors performed an in-depth review of PSEG's apparent cause evaluation and corrective actions associated with notification 20429642 and station order 70101514, Computational Systems, Inc. (CSI) Vibration Monitoring Database Configuration Concern. Specifically, PSEG had not properly configured a pump vibration monitoring database with correct values for the maximum frequency limits used when measuring component vibration during American Society of Mechanical Engineers IST.

The inspectors assessed PSEG's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of PSEG's corrective actions to determine whether PSEG was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of PSEG's CAP and 10 CFR 50 Appendix B. In addition, the inspectors performed field walkdowns, and interviewed maintenance, engineering, and information technology personnel to assess the effectiveness of the implemented corrective actions. The documents reviewed are listed in the Attachment.

b. Findings and Observations

No findings of significance were identified.

PSEG determined that human error was the direct cause of the CSI vibration database configuration issue. PSEG also determined that lack of a comprehensive peer review of the database and limited formal training were contributing causes and factors.

PSEG conducted a thorough technical review of the CSI vibration database to correct existing discrepancies and conducted adequate formal training. After the database revisions, PSEG had a non-PSEG independent third party evaluate the database for technical adequacy. No additional discrepancies were noted. The inspectors reviewed selected database records and did not identify any additional issues. The inspectors determined PSEG's overall response to the issue was commensurate with the safety significance, timely, and included appropriate compensatory actions. The inspectors determined that the actions taken were reasonable to resolve the database discrepancies.

However, the inspectors concluded that PSEG's apparent cause evaluation for the CSI vibration database configuration issue was, in part, narrowly focused because it lacked corrective actions to preclude a similar configuration control deficiency from occurring in the future. Specifically, the inspectors identified that PSEG's apparent cause evaluation did not identify a lack of any formal administrative controls for database configuration, and did not identify that the database software was performing calculations which affected vibration test results for safety-related equipment. Therefore no additional database discrepancies were identified and equipment operability or functionality was not adversely affected. Therefore the inspectors determined that this performance deficiency was minor it was not a precursor to a significant event, it would not have led to a more significant safety concern if left uncorrected, it did not cause a PI to exceed a threshold and it did not adversely affect the objectives for any of the seven ROP cornerstones. PSEG entered the inspector's observations into their corrective action program.

**4OA5 Other Activities****.1 Temporary Instruction (TI) 2515/180 - Inspection of Procedures and Processes for Managing Fatigue****a. Inspection Scope**

The objective of this TI was to determine if PSEG's implementation procedures and processes required by 10 CFR 26, Subpart I, "Managing Fatigue," are in place to reasonably ensure that the requirements specified in Subpart I are being addressed. This TI applies to all operating nuclear power reactor licensees, but is intended to be performed for one site per utility. On February 23, 2010, the inspectors interfaced with the appropriate station staff to obtain and review station policies, procedures, and processes necessary to complete all portions of this TI.

**b. Findings and Observations**

No findings of significance were identified.

The inspectors confirmed that the PSEG procedures listed in Section 4OA5 of the Attachment contained the necessary processes to ensure compliance with requirements in 10 CFR 26, Subpart I, "Managing Fatigue."

**4OA6 Meetings, including Exit**

On April 9, 2010, the inspectors presented inspection results to Mr. J. Perry and other members of his staff. The inspectors asked PSEG whether any materials examined during the inspection were proprietary. No proprietary information was identified.

**ATTACHMENT: SUPPLEMENTAL INFORMATION**

Enclosure

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

J. Perry, Hope Creek Site Vice President  
 L. Wagner, Hope Creek Plant Manager  
 E. Carr, Operations Director  
 E. Casulli, Shift Operations Superintendent  
 K. Chambliss, Work Management Director  
 P. Duca, Senior Engineer, Regulatory Assurance  
 M. Gaffney, Regulatory Assurance Manager  
 K. Knaide, Engineering Director  
 W. Kopchick, Plant Engineering Manager  
 F. Mooney, Maintenance Director  
 H. Trimble, Radiation Protection Manager

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

05000354/2010-002-01	NCV	Control Room Chiller Trip (Section 1R12)
05000354/2010-002-02	NCV	HPCI Booster Pump Outboard Bearing Low Oil Level and Leak (Section 1R15)

**LIST OF DOCUMENTS REVIEWED**

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records:

HCGS UFSAR  
 TS Action Statement Log  
 HCGS Narrative Logs

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

WC-AA-107, Seasonal Readiness, Revision 9  
 HC.OP-AB.COOL-0001, Station Service Water, Revision 17

Notifications

20451039      20452757      20452757

Other Documents

Hope Creek Winter/Grassing Readiness Reports

**Section 1R04: Equipment Alignment**

Procedures

HC.OP-SO.KJ-0001, Emergency Diesel Generators Operation, Revision 50  
HC.OP-SO.BJ-0001, High Pressure Coolant Injection System Operation, Revision 38  
HC.OP-SO.GK-0001, Control Room Ventilation System Operation, Revision 14

Drawings

M-56-1, HPCI Pump Turbine, Revision 32

Notifications (\*NRC identified)

20454751\* 20454739\* 20454738\* 20454518\* 20454520\*

**Section 1R05: Fire Protection Measures**

Procedures

FRH-II-433, A & C SACS room, 102' elevation, Revision 3  
FRH-II-432, B & D SACS room, 102' elevation, Revision 3  
FRH-II-461, SLC system room, 162' elevation, Revision 3  
FRH-II-511, Auxiliary Building, 54' elevation, Revision 6  
FRH-II-413, C RHR room, Revision 3  
FRH-II-412, D RHR room, Revision 3

Notifications (\*NRC identified)

20448083\* 20455839\*

**Section 1R06: Flood Protection**

Calculations

BC-31, ECCS Pump Rooms Flood Level Alarm, Revision 1  
11-92, Reactor Building Flooding Elevation 54' & 77', Revision 0

Drawings

C-0306-0, Floor Hatch Covers, Revision 9

Notifications (\*NRC identified)

20238348 20452948\* 20449697\* 20448896\* 20452615\*

Orders

70047651 70050702

Other Documents

ND.DE-PS.ZZ-0010, Internal Hazards Program, Revision 1

**Section 1R11: Licensed Operator Regualification Program**

Procedures

HC.OP-AB.RPV-0001, Reactor Power, Revision 12

HC.OP-AB.RPV-0003, Recirculation System/Power Oscillations, Revision 20

Other Documents

Simulator Scenario SG-664

**Section 1R12: Maintenance Effectiveness**

Procedures

HC.OP-SO.GK-0001, Control Area Ventilation System Operation, Revision 14

HC.MD-PM.PB-0001, 4.16 KV Breaker Cleaning and Preventive Maintenance, Revisions 24 and 25

Notifications (\*NRC identified)

20441285    20448277    20403873    20451889\*    20441173

Orders

70104379    60087115

Other Documents

System Heath Report for Control Room Chilled Water – 4<sup>th</sup> quarter 2009

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

Procedures

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

Notifications (\*NRC identified)

20450613

Completed Surveillances

HC.OP-ST.KJ-0001, EDG 1AG400 Operability Test - Monthly, performed 12/28/09

HC.OP-ST.KJ-0003, EDG 1CG400 Operability Test - Monthly, performed 1/4/10

HC.OP-ST.KJ-0004, EDG 1DG400 Operability Test - Monthly, performed 1/14/10

Orders

70106605

Other Documents

HCGS PRA Risk Evaluation for Work Week 1004 (1/19/10 – 1/23/10), Revisions 0 & 1

HCGS PRA Risk Evaluation for Work Week 1005 (1/26/10 – 1/30/10), Revision 0

HCGS PRA Risk Evaluation for Work Week 1007 (2/7/10 – 2/11/10), Revision 0

HCGS PRA Risk Evaluation for Work Week 1008 (2/14/10 – 2/18/10), Revisions 0 & 1

**Section 1R15: Operability Evaluations**Procedures

HC.OP-SO.KJ-0001, Emergency Diesel Generators Operation, Revision 54

HC.OP-AR.KJ-0007, D Emergency Diesel Panel 1DC423 Alarm Response Procedure, Revision 21

HC.OP-DL.ZZ-0004, Reactor Building Log, Revision 40

Calculations

SC-KJ-0185-1, Diesel Generator A-D Lube Oil Temperature and Jacket Water Temperature, Revision 4

D3.38, Design, Installation and Test Specification for HPCI System for HCGS, Revision 9

Notifications (\*NRC-identified)

20449923	20455935	20453281	20453343	20454801*	20446348
20442190*	20444855*	20444949*	20445758	20445849	

Orders

60089428      70105517      70105640

Other Documents

10855-M018, Standby Diesel Generators for the HCGS, Revision 7

H10-06, 1CG400 EDG Functional Testing, 3/6/2010

**Section 1R18: Plant Modifications**Design Change Package

DCP 80093784, Replacement of AK400 Chiller Bearing Oil and Refrigerant Discharge Temperature Switches, Revision 1

Procedures

LS-AA-104, 50.59 Review Process, Revision 6

HC.OP-AB.BOP-001, Feedwater Heating, Revision 12

HC.OP-SO.GJ-0001(Q), A(B)K400 Control Area Chilled Water System Operation, Revision 48

50.59 Reviews, Screenings and Evaluations

50.59 Screening HC-10-013

DCP 80093784, Replacement of 1 AK400 Chiller Bearing Oil and Refrigerant Discharge Temperature Switches

Drawings

M-04-1, Vents &amp; Drain Heaters 3, 4, 5, &amp; 6, Revision 31

J-04-0, Logic Diagram Vents &amp; Drains Heaters 3, 4, 5, &amp; 6, Shts.

PJ203-0253, Wiring Diagram – Cabinet No. 1BC102, Sht. 12, Revision 3

Notifications

20446214      20446917

Orders

80100749 (TCCP 10-005)

Other Documents

Instrument Calibration Data Sheet – AK400 Refrigerant Discharge Temp Ind SW, 2/2/2010  
 Instrument Calibration Data Sheet – AK400 Thrust Bearing Oil Temp SW, 2/1/2010

**Section 1R19: Post-Maintenance Testing**Completed Surveillances

HC.RE-ST.BF-0001, Control Rod Scram Time Surveillance, 1/20/10  
 HC.OP-ST.KJ-0003, EDG 1CG400 In-service Test, 3/5/2010  
 HC.OP-IS.BJ-0001, HPCI Main and Booster Pump Set – Inservice Test, 10/28/2009  
 HC.OP-ST.GK-0002, Control Room Emergency Filtration System, Isolation/Actuation Functional  
 Test – 18 Months, partial, performed 2/4/2010  
 HC.OP-SO.GK-0001, Control Area Ventilation System Operation, performed 2/4/2010

Procedures

HC.OP-SO.KJ-0001, EDGs Operations, Revision 54  
 HC.OP-AR.KJ-0007, Diesel Generator Remote Engine Control Panel 1DC423,  
 Revision 21  
 HC.OP-IS.BJ-0001, HPCI Main and Booster Pump Set – Inservice Test, Revision 52

Notifications (\*NRC identified)

20455935

Orders

Work Order 4084347 AD200FV-1650A ACTUATOR REBUILD

**Section 1R20: Refueling and Other Outage Activities**Completed Surveillances, Verifications, and/or Inspections

HC.OP-GP.ZZ-0002, Primary Containment Closeout, performed 1/18/10  
 HC.OP-ST.BB-0001, Recirculation Jet Pump Operability - Daily, performed 1/20/10  
 HC.OP-ST.GS-0001, Drywell and Suppression Chamber Oxygen Concentration Verification -  
 Weekly, performed 1/21/10  
 HC.RE-ST.ZZ-0005 Form 3, ECP Check Data Form, performed 1/19/10

Notifications (\*NRC identified)

20426228	20428422	20442488	20447601	20448083	20447557*
20447558*	20447698*	20446634	20447897	20448159	20447719
20447810	20447917	20447922	20448135	20447468	

Orders

70104382

Other Documents

HC.OP-DL.ZZ-0026 Attachment 3s, Reactor Coolant System T/S 4.4.6.1.1 and 4.4.6.1.2,  
 performed 1/19/10

Procedures

HC.OP-GP.ZZ-0002, Primary Containment Closeout, Revision 12  
 HC.OP-IO.ZZ-0002, Preparation for Plant Startup, Revision 53

HC.OP-IO.ZZ-0003, Startup from Cold Shutdown to Rated Power, Revision 91  
HC.OP-SO.GS-0001, Containment Atmosphere Control System Operation, Revision 30

**Section 1R22: Surveillance Testing**

Procedures

HC.OP-ST.KJ-0003, EDG 1CG400 In-service Test, Revision 6  
HC.OP-IS.EG-0003, C Safety Auxiliary Cooling System Pump In-service Test, Revision 31  
HC.OP-IS.EA-0003, C Service Water Pump In-service Test, Revision 45  
HC.OP-IS.BC-0002, C RHR Pump In-service Test, Revision 34  
HC.OP-IS.BJ-0101, HPCI System In-service Test, Revision 58  
HC.OP-IS.BC-0104, Residual Heat Removal Subsystem D Valves - Inservice Test, Revision 23

**Section 2RS1: Radiological Hazard Assessment and Exposure Controls**

Radiological Survey Maps: 4401-B (1/16/10); 4412/4413 (2/9/10); 4410/4411 (2/9/10); 4408 (2/9/10); 4405 (2/21/10); 4403 (2/14/10); 4402 (2/8/10)

**Section 2RS2: Occupational ALARA Planning and Controls**

EPRI BWR BRAC Summary, July 2009  
Hope Creek BRAC Milestones (June 1984 – May 2008)

Procedures

RP-AA-400, Revision 5, ALARA Program  
RP-AA-1001, Revision 1, Establishing Collective Radioactive Exposure Estimates and Goals  
RP-AA-401, Revision 11, Operational ALARA Planning and Controls

**Section 2RS4: Occupational Dose Assessment**

Fastscan WBC System Calibration, March 1, 2010  
NVLAP Personnel Dosimetry Performance Testing for Landaur, Inc. April 23, 2008  
NVLAP On-Site Assessment of Landaur, Inc. October 2008

**Section 2RS5: Radiation Monitoring Instrumentation**

Most Recent Calibration Results:

Process Radiation Monitoring Filtration Recirculation Ventilation System Vent (WRGM)  
Process Radiation Monitoring Filtration Recirculation Ventilation System Vent High Range Noble Gas  
Process Radiation Monitoring Liquid Radwaste Discharge Monitor  
Process Radiation Monitoring North Plant Vent (WRGM)  
Process Radiation Monitoring South Plant Vent (WRGM)  
Process Radiation Monitoring South Plant Vent High Range Noble Gas  
Process Radiation Monitoring Turbine Building Circulating Water  
Process Radiation Monitoring Cooling Tower Blowdown

**Section 2RS6: Radioactive Gaseous and Liquid Effluent Treatment**

ODCM for PSEG Nuclear LLC HCGS, Revision 24

2008 Annual Radioactive Effluent Release Report for the HCGS

Methyl Iodide & DOP Testing Results for : 1A-VH 400; 1B-VH400; 1A-VH213; 1B-VH213; 1C-VH213; 1D-VH213; 1E-VH213; 1F-VH213; 1A-VH206; 1B-VH206; 1C-VH206; 1D-VH206; 1E-VH206; 1F-VH206; 1A-VH301; 1B-VH301; 1C-VH301; 0A-VH305; 0B-VH305; 0C-VH305; 0A-VH306; 0B-VH306

Most Recent Calibration Results:

Process Radiation Monitoring Filtration Recirculation Vent Process Flow  
Process Radiation Filtration Recirculation Ventilation Sample Flow System  
Process Radiation Monitoring Flow Elements North Plant Vent Process Flow  
Process Radiation Monitoring South Plant Vent Sample Flow System

Analytics Radiochemistry Cross Check Program Results for 2009

ODCM for PSEG Nuclear LLC HCGS, Revision 24

Self-Assessment # 70096339, HCGS, Public Rad Safety – RETS Self-Assessment

Gaseous Effluent Release Permits: 201467.011.554.G; 201470.011.555.G; 201472.011.556.G;  
201468.013.635.G; 201471.013.636.G

Liquid Effluent Release Permits: 201912.009.512.L; 201909.009.511.L; 201901.004.363.L;  
201917.005.191.L; 201906.002.153.L

**Section 4OA1: Performance Indicator Verification**

Procedures

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

LS-AA-2010, Monthly Data Elements for NRC/WANO Unit/Reactor Shutdown Occurrences, Revision 6

LS-AA-2030, Monthly Data Elements for NRC Unplanned Power Changes per 7000 Critical Hours, Revision 6

Other Documents

Hope Creek Integrated Inspection Reports 2009002, 2009003, 2009004, 2009005

NRC PIs for 1<sup>st</sup> quarter, 2<sup>nd</sup> quarter, 3<sup>rd</sup> quarter, and 4<sup>th</sup> quarter 2009

NEI 99-02, Regulatory Assessment PI Guideline, Revision 5

**Section 4OA2: Problem Identification and Resolution**

Procedures

IT-AA-101, Digital Technology Systems QA (DTSQA) Procedure, Revision 0

MA-AA-716-230, Predictive Maintenance Program, Revision 5

MA-AA-716-230-1002, Vibration Analysis / Acceptance Guideline, Revision 2

MA-AA-716-230-1005, CSI RBMware Database Setup Guideline, Revision 0

MA-AA-716-230-1007, Setup and Operation of CSI Handheld Vibration monitoring Equipment using RBMware, Revision 5

NC.NA-AP.ZZ-0064(Q), Software QA, Revision 2

Notifications (\*NRC identified)

20296968	20339393	20339397	20429642	20439009	20445279
20445381	20454234*	20454147*			

M&TE Calibration Certification Reports

390413	390417	399951	400585	400589	400590
400593	400600	400603	400604	400606	400991
401003	401005	C200800821	C200800839		

Orders

70101514	70105415
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Vendor Manuals

VTD 431033, RBMwizard Database Builder, dated 11/29/2007  
 VTD 431036, AMS Machinery Health Manager, dated 11/29/2007  
 VTD 431037, VibView, dated 11/21/2007

Miscellaneous

Letter, M. Burch, MISTRA Inc., to M. Kelly, PSEG, IST Vibration Database Review, dated Oct. 2009  
 NUREG-1482, Section 5.4, Guidelines for IST - Monitoring Pump Vibration, Revision 1  
 Operations Standing Order 2008-40, Vibration Program Transition Plan, dated 10/07/2008  
 Operations Standing Order 2010-1, Use of matched CSI Box & Vibration Probe, dated 1/1/2010

**Section 40A5: Other Activities**Procedures

LS-AA-119, Fatigue Management and Work Hour Limits, Revision 6  
 LS-AA-119-1001, Fatigue Management, Revision 0  
 LS-AA-119-1002, Scoping of Work Hour Limits, Revision 0  
 LS-AA-119-1003, Calculating Work Hours, Revision 0  
 LS-AA-119-1004, Reviews and Reporting, Revision 0  
 LS-AA-119-1005, Manual Scheduling of Work Hours, Revision 0  
 SY-AA-2, Nuclear Policy, Fitness for Duty, Revision 1  
 SY-AA-102, PSEG Nuclear Fitness for Duty Program, Revision 15  
 SY-AA-102-220, Fitness for Duty Reporting Requirements, Revision 7

Self-Assessments

Implementation of Work Hour Rules, SAP # 20448262 and 20443384

Notifications (\*NRC identified)

20448894\*

## LIST OF ACRONYMS

ADAMS	Agency-wide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CREF	Control Room Emergency Filtration
CSI	Computational Systems, Inc.
DAC	Derived Air Concentration
ED	Electronic Dosimeter
EDG	Emergency Diesel Generator
EPD	Electronic Personnel Dosimeter
FSAR	Final Safety Analysis Report
GPI	Groundwater Protection Initiative
HCGS	Hope Creek Generating Station
HPCI	High Pressure Coolant Injection
HX	Heat Exchanger
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IST	Inservice Testing
LER	Licensee Event Report
NCV	Non-cited Violation
MDA	Minimum Detectable Activity
NCV	Non-cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
ODCM	Off-Site Dose Calculation Manual
OOS	Out-of-Service
PI	Performance Indicator
PI&R	Problem Identification and Resolution
PMT	Post-maintenance Testing
PSEG	Public Service Enterprise Group Nuclear LLC
QA	Quality Assurance
RCIC	Reactor Core Isolation Cooling
RETS	Radiological Effluent Technical Specifications
RHR	Residual Heat Removal
RWP	Radiation Work Permit
SACS	Safety Auxiliaries Cooling System
SDP	Significance Determination Process
SLC	Standby Liquid Control
SSCs	Structures, Systems, and Components
ST	Surveillance Testing
SW	Service Water
TI	Temporary Instruction
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report