

March 21, 2002

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

SUBJECT: HOPE CREEK NUCLEAR GENERATING STATION - NRC INSPECTION
REPORT 50-354/01-12

Dear Mr. Keiser:

On February 9, 2002, the NRC completed an inspection of your Hope Creek facility. The enclosed report documents the inspection findings which were discussed on February 13, with Mr. Dave Garchow 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. Specifically, this inspection involved six weeks of resident inspection, a region-based biennial inspection of maintenance rule implementation, and a region-based inspection of occupational radiation protection.

Based on the results of this inspection, the inspectors identified two issues of very low safety significance (Green). These issues were determined to involve violations of NRC requirements. However, because of their very low safety significance and because they had been entered into your corrective action program, the NRC is treating these issues as non-cited violations, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny these non-cited violations, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, 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 facility.

Immediately following the terrorist attacks on the World Trade Center and the Pentagon, the NRC issued an advisory recommending that nuclear power plant licensees go to the highest level of security, and all promptly did so. With continued uncertainty about the possibility of additional terrorist activities, the Nation's nuclear power plants remain at the highest level of security and the NRC continues to monitor the situation. This advisory was followed by additional advisories, and although the specific actions are not releasable to the public, they generally include increased patrols, augmented security forces and capabilities, additional security posts, heightened coordination with law enforcement and military authorities, and more limited access of personnel and vehicles to the sites. The NRC has conducted various audits of your response to these advisories and your ability to respond to terrorist attacks with the capabilities of the current design basis threat (DBT). On February 25, 2002, the NRC issued an Order to all nuclear power plant licensees, requiring them to take certain additional interim

Mr. Harold W. Keiser

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compensatory measures to address the generalized high-level threat environment. With the issuance of the Order, we will evaluate PSEG Nuclear's compliance with these interim requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure 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.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Glenn W. Meyer, Chief
Projects Branch 3
Division of Reactor Projects

Enclosure: Inspection Report 50-354/01-12
Attachment: Supplemental Information

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

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

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

Report No: 50-354/01-12

Licensee: PSEG Nuclear LLC

Facility: Hope Creek Nuclear Generating Station

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

Dates: December 30, 2001 - February 9, 2002

Inspectors: J. G. Schoppy, Jr., Senior Resident Inspector
C. G. Cahill, PE, Resident Inspector
J. T. Furia, Senior Health Physicist
M. S. Ferdas, Reactor Engineer
R. S. Barkley, Senior Project Engineer

Approved By: Glenn W. Meyer, Chief, Projects Branch 3
Division of Reactor Projects

Summary of Findings

IR 05000354-01-12, on 12/30/01 - 2/9/02, Public Service Electric Gas Nuclear LLC, Hope Creek Generating Station, Post Maintenance, Surveillance Testing.

The inspection was conducted by resident inspectors, a regional radiation specialist, a regional reactor inspector, and a regional project inspector. This inspection identified two Green findings, both of which were non-cited violations. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, *Significance Determination Process* (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at <http://www.nrc.gov/NRR/OVERSIGHT/index.html>. Findings for which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified a non-cited violation for PSEG Nuclear's failure to establish adequate corrective actions to assure that a B emergency diesel generator (EDG) degraded crankcase vacuum condition that existed on October 30, 2000, was promptly identified and corrected.

The safety significance of this finding was very low, because PSEG Nuclear's resultant investigation and operability determination determined that the diesel engine was not experiencing excessive blowby and the engine did not exhibit any mechanical conditions that could generate the temperatures required to initiate a crankcase explosion. (Section 1R19)

- Green. The inspectors identified a non-cited violation for PSEG Nuclear's failure to establish adequate foreign material exclusion controls during B EDG maintenance conducted in the Fall 2001 refueling outage (RF10).

The safety significance of this finding was very low because PSEG Nuclear's resultant operability determination determined that the B EDG was operable and capable of performing its safety function. (Section 1R22.1)

B. Licensee Identified Violations

The inspectors did not review any licensee identified violations of more than minor significance.

Report Details

SUMMARY OF PLANT STATUS

The Hope Creek plant operated continuously at or near full power for the duration of the inspection period except for (1) planned maintenance power reductions on December 30 and January 18 for turbine control valve testing, (2) a planned power reduction on February 1 for reactor recirculation motor generator speed stop surveillances, and (3) an unplanned power reduction to 95 percent on February 5 in response to the trip of the 1B feedwater heater.

1. REACTOR SAFETY Initiating Events, Mitigating Systems, and Barrier Integrity [REACTOR - R]

R04 Equipment Alignment

.1 High Pressure Coolant Injection Outage

a. Inspection Scope

The inspectors performed equipment alignment verifications on redundant equipment during an emergent high pressure coolant injection (HPCI) system outage. The inspectors verified by reviewing the technical specifications (TSs), plant walkdowns, and main control room tours that the unplanned HPCI outage did not adversely affect the redundant high pressure injection system (i.e., RCIC) or other emergency core cooling systems (ECCS). In particular, the inspectors performed walkdowns of the following equipment and areas:

- A, B, C, and D emergency diesel generators (EDGs).
- The reactor core isolation cooling (RCIC) pump room and 250V battery room.
- 4160 V vital switchgear rooms and 480V vital motor control centers.
- ECCS pump rooms.

The inspectors also verified that HPCI was restored to an operable condition after the corrective maintenance was complete. Additionally, the inspectors reviewed various corrective action notifications associated with equipment alignment deficiencies (20089142, 20089445, and 20090671).

b. Findings

No findings of significance were identified.

.2 B Emergency Diesel Generator Lube Oil System Walkdown

a. Inspection Scope

The inspectors performed a complete equipment alignment check on the B EDG lube oil system to verify that the system was properly configured and to identify any discrepancies that might impact the function of the system. The alignment check included a review of documents to determine the correct system lineup and performance

of a field walkdown to identify any discrepancies between the existing lineup and the prescribed lineup. Specifically, the following documents and procedures were reviewed:

- *Emergency Diesel Generators Operation* (HC.OP-SO.KJ-0001)
- *Emergency Diesel Generator BG400 Operability* (HC.OP-ST.KJ-0001)
- *EDG 1BG400-24 Hour Operability Run and Hot Restart Test* (HC.OP-ST.KJ-0015)

The inspectors also reviewed various corrective action notifications associated with equipment alignment deficiencies and the B EDG lube oil system (20089768, 20085213, 20086231, and 20078637).

b. Findings

No findings of significance were identified.

R05 Fire Protection

.1 Plant Walkdowns

a. Inspection Scope

The inspectors performed walkdowns of the lower control equipment room, remote shutdown panel room, 4 KV in-feed offsite bus ducts and reactor building 102' elevation (rooms 4301, 4309, 4310 and 4311). Plant walkdowns included observations of combustible material control, fire detection and suppression equipment availability, and compensatory measures. The inspectors performed fire protection inspections due to the potential to impact mitigating systems in these areas. The inspectors reviewed Hope Creek's Individual Plant Examination for External Events for risk insights concerning these areas. Additionally, the inspectors reviewed several notifications associated with fire protection deficiencies (20088014, 20088736, 20088921, 20089034, 20089639, 20090635, 20090639, and 20090754).

b. Findings

No findings of significance were identified.

.2 Hydrogen Storage Locations

a. Inspection Scope

The inspector reviewed the adequacy of the Hope Creek hydrogen storage locations in accordance with Temporary Instruction (TI) 2515/146. Specifically, the inspector verified that PSEG Nuclear maintained:

- Greater than 50 feet separation between the hydrogen storage and ventilation intakes.

- Greater than 50 feet distance between hydrogen storage and risk significant tanks or structures, systems, and components (SSCs).

b. Findings

No findings of significance were identified.

R11 Licensed Operator Requalification

- a. The inspectors observed two simulator training scenarios to assess operator performance and training effectiveness. The scenarios involved a seismic event, a stuck open safety relief valve, a loss of overhead annunciators, service water (SW) grassing, and a small break loss of coolant accident. The inspectors assessed simulator fidelity and observed the simulator instructor's critique of operator performance. The inspectors attended an operating experience (OE) training session concerning a recent plant event (notification 20088047). The inspectors reviewed corrective action notification 20088806 associated with a licensed operator requalification program issue. The inspectors also observed control room activities with emphasis on simulator identified areas for improvement.

b. Findings

No findings of significance were identified.

R12 Maintenance Rule Implementation

.1 Performance Monitoring

a. Inspection Scope

The inspectors reviewed all corrective action notifications initiated between October 1, 2001, and November 15, 2001, for maintenance rule (MR) screening. The inspectors further reviewed four notifications that included system engineer functional failure determinations (20079336, 20080824, 20081243, and 20081475). The inspectors also reviewed Hope Creek Expert Panel Meeting Minutes (HCEP 02-001 and HCEP 02-002).

To assess PSEG Nuclear's implementation of 10 CFR 50.65 *Maintenance Rule* requirements, the inspectors reviewed the following documents:

- SE.MR.HC.02, *System Function Level Maintenance Rule VS Risk Reference*
- NRC Regulatory Guide 1.160, *Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, Revision 2
- NUMARC 93-01, *Industry Guideline For Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*, Revision 2

b. Findings

No findings of significance were identified.

.2 Maintenance Rule Implementation - Biennial Inspection

a. Inspection Scope

The inspector reviewed MR documentation to assess: (1) the scoping and classification of SSCs in accordance with 10 CFR 50.65; (2) the appropriateness of performance criteria for SSCs classified as 10 CFR 50.65(a)(2); (3) the goals and corrective actions for SSCs classified as 10 CFR 50.65(a)(1); and (4) the characterization and corrective actions for failed SSCs. The inspector reviewed performance-based problems involving in-scope SSCs to assess the effectiveness of the MR program and the coding of system failures in the corrective action program to independently assess the adequacy of the MR implementation for the selected risk-significant items. The inspector also reviewed system health reports and PSEG Nuclear's action plans to improve system reliability. The inspector interviewed performance engineers and MR personnel.

The inspector reviewed selected 10 CFR 50.65(a)(1) high risk significant systems to determine if: (1) goals and performance criteria were appropriate; (2) industry OE was considered; (3) corrective action plans were in place; and (4) performance was being effectively monitored. In this area, the inspector reviewed the following systems:

- HPCI
- Control room chilled water (classified as high safety significant system)

The inspector reviewed selected 10 CFR 50.65(a)(2) high risk significant systems, to verify that performance was acceptable. In this area, the inspector reviewed the following systems:

- RCIC
- SW
- EDG
- Standby liquid control

The inspector reviewed the periodic evaluations required by 10 CFR 50.65 (a)(3) for PSEG Nuclear to verify that the SSCs within the MR scope were included in the evaluations and the balancing of reliability and unavailability was given adequate consideration. The inspector reviewed PSEG Nuclear's latest periodic evaluation, *2001 Periodic Maintenance Effectiveness Assessment, Report 80028267*, November 1999 through August 2001.

The inspector reviewed selected items in the corrective action program to verify that PSEG Nuclear was identifying issues related to the MR at an appropriate threshold, entering them in the corrective action program, and prescribing the appropriate corrective actions (notifications 20088386, 20088387, 20075384, 20084851, 20078268, 20029308, 20054834, 20070152, 20044403, 20077196, 20072101, 20075455, 20060066, and 20026913).

The inspector reviewed the following documents:

- *Equipment Reliability Process (NC.ER-AP.ZZ-0010), Revision 1*
- *Monitoring the Effectiveness of Maintenance (NC.NA-AP.ZZ-0016), Revision 5*
- *Operating Experience (OE) Program (NC.NA-AP.ZZ-0054), Revision 6*
- *Maintenance Rule (a)(1) Evaluations and Goal Monitoring (SH.ER-DG.ZZ-0002), Revision 0*
- *2001 Periodic Maintenance Effectiveness Assessment November 1999 through August 2001*
- *System Health Report, High Pressure Coolant Injection, Period: 6/1/01 to 9/30/01*
- *System Health Report, Control Room Chilled Water System, Period: 10/01/01 to 12/31/01*
- *System Health Report, Service Water, Period: 8/01/01 to 11/30/01*
- *System Health Report, Standby Liquid Control, Period: 7/1/01 to 9/30/01*
- *System Health Report, Emergency Diesel Generator, Period 6/30/01 to 9/30/01*
- *System Health Report, Reactor Core Isolation Cooling, Period 7/1/01 to 9/30/01*
- *Hope Creek Expert Panel Meeting Minutes, dated 8/3/2000*
- *Hope Creek Expert Panel Meeting Minutes, dated 12/18/2001*

b. Findings

No findings of significance were identified.

R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors evaluated on-line risk management for the following configurations: (1) the unplanned outage of HPCI concurrent with planned maintenance on the A SW pump and the B electro-hydraulic control pump; and (2) the unplanned outage of the B EDG. The inspectors reviewed maintenance risk evaluations, work schedules, recent corrective action notifications, and control room logs to verify that other concurrent planned and emergent maintenance or surveillance activities did not adversely affect the plant risk already incurred with the out of service components. The inspectors also used PSEG Nuclear's on-line risk monitor (Equipment Out Of Service workstation) to evaluate the risk associated with the plant configuration and to assess PSEG Nuclear's risk management. In addition, the inspectors reviewed other notifications involving risk assessment and emergent work (20087443, 20087471, 20087887, 20088047, 20088057, 20088715, 20089390, 20089418, 20089839, and 20090613).

To assess PSEG Nuclear's risk management, the inspectors reviewed the following documents:

- SE.MR.HC.02, *System Function Level Maintenance Rule VS Risk Reference*
- HCGS PSA Risk Evaluation Forms for Work Week Nos. 52 - 57
- SH.OP-AP.ZZ-108, *On-Line Risk Assessment*
- NRC Regulatory Guide 1.182, *Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants*
- Section 11, *Assessment of Risk Resulting from Performance of Maintenance Activities*, dated February 11, 2000, of NUMARC 93-01, *Industry Guideline For Monitoring the Effectiveness of Maintenance at Nuclear Power Plants*

b. Findings

No findings of significance were identified.

R14 Personnel Performance During Nonroutine Plant Evolutions

a. Inspection Scope

The inspectors responded to the control room and observed operator actions in response to a trip of the 5B feedwater heater on February 4, a trip of the 1B feedwater heater on February 5, and a trip of the 10K107 service air compressor concurrent with the planned outage of the emergency instrument air compressor on February 6. The inspectors reviewed the operations logs, applicable abnormal operating procedures, the associated Hope Creek Transient Assessment Response Plan (TARP) reports, and notifications 20090613, 20090761, and 20090833.

The inspectors reviewed the following documents:

- *Loss of Feedwater Heaters* (HC.OP-AB.ZZ-0118)
- *Reactor Power Oscillations* (HC.OP-AB.ZZ-0300)
- *Loss of Instrument and/or Service Air* (HC.OP-AB.ZZ-0131)
- TARP Report: Spurious Trip of the 5B Feedwater Heater, dated February 4, 2002
- TARP Report: Spurious Trip of the 1B Feedwater Heater, dated February 5, 2002

b. Findings

No findings of significance were identified.

R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the operability determinations for (1) a non-conforming condition associated with the qualification of pipe support U-bolts in the main steam line drain valve piping system (evaluation 70022421); (2) a non-conforming condition

associated with the painting of the gaskets on the HPCI room blowout panel (200088706); (3) a C EDG fuel oil day tank level switch deficiency (evaluation 70022681); and (4) lube oil strainer and crankcase vacuum degraded conditions associated with the B EDG (20089427 and 20089428). The inspectors also reviewed all other PSEG Nuclear identified safety-related equipment deficiencies during this report period and assessed the adequacy of the operability screenings.

The inspectors reviewed the following documents:

- NRC Information Notice 92-78, *Piston to Cylinder Liner Tin Smearing on the Cooper-Bessemer KSV Diesel Engines*
- NRC Information Notice 96-67, *Vulnerability of Emergency Diesel Generators to Fuel Oil/Lubrication Oil Incompatibility*
- NRC IE Circular No. 80-05, *Emergency Diesel-Generator Lubricating Oil and Onsite Supply*

b. Findings

No findings of significance were identified.

R16 Operator Workarounds

a. Inspection Scope

The inspectors reviewed corrective action notifications, operator logs, and instrument panel status to evaluate potential impacts on the operators' ability to implement abnormal or emergency operating procedures. The inspectors evaluated the cumulative effects of operator workarounds as related to (1) the reliability, availability, and potential for mis-operation of plant systems; (2) the potential to increase an initiating event frequency or to affect multiple mitigating systems; and (3) operator ability to respond in a correct and timely manner to plant transients and accidents. In addition, the inspectors reviewed two notifications involving control room indicator performance indicators (20083472 and 20083628).

The inspectors also reviewed the following documents:

- *Condition Resolution Operability Determination Notebook*
- *Inoperable Instrument/Alarm/Indicators/Lamps/Device Log*
- *Inoperable Computer Point Log*
- *Hope Creek Operator Workarounds List*
- *Hope Creek Operator Concerns List*
- *Operator Burden Program (SH.OP-AP.ZZ-0030)*
- *Operator Burden Aggregate Review; dated 10/26/01, 12/05/01, and 1/02/02*

b. Findings

No findings of significance were identified.

R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed the post maintenance testing (PMT) data for the B EDG crankcase vacuum work (work order 60013407) and the B EDG strainer replacement (work order 60025798) to verify that the PMTs were adequate for the scope of maintenance performed. The inspectors reviewed *HC.OP-ST.KJ-0015(Q)*, *EDG 1BG400 -24 Hour Operability Run and Hot Restart* conducted on October 30, 2000, January 23, 2002, and January 24, 2002. The inspectors also reviewed notifications concerning problems associated with PMTs (20045454, 20088706, 20089362, 20089428, and 20090398).

The inspectors reviewed the following documents:

- *EDG 1BG400 -24 Hour Operability Run and Hot Restart* (HC.OP-ST.KJ-0015)
- Work Order 70022594
- Work Order 60013407
- *NRC Bulletins, Circulars, Information Notices and Generic Letters Applicable to the Emergency Diesel-Generator System* (DE-CB.KJ-0083)
- NRC Information Notice 92-78, *Piston to Cylinder Liner Tin Smearing on the Cooper-Bessemer KSV Diesel Engines*

b. Findings

The inspectors identified a non-cited violation for PSEG Nuclear's failure to establish adequate corrective actions to assure that the B EDG degraded crankcase vacuum condition was promptly identified and corrected. The safety significance of this finding was very low, because PSEG Nuclear's resultant operability determination determined that the B EDG was operable.

On January 23, 2002, during a 24-hour TS surveillance run of the B EDG, the operators observed that crankcase vacuum decreased from negative 1.2 inches of water to 0 inches of water in approximately 9 hours. The vacuum steadied off at 0 inches of water for the remainder of the run. The operators initiated notification 20089428 to document this adverse trend. This surveillance run was terminated approximately 20 hours into the 24-hour run due to high lube oil strainer differential pressure (D/P). When the surveillance run was repeated on January 24, 2002, crankcase vacuum again experienced a similar adverse trend.

The inspectors reviewed the previous 24-hour TS surveillance run of the B EDG that was conducted on October 30, 2000, and found that PSEG Nuclear had previously observed a similar, unsatisfactory crankcase vacuum trend. The crankcase vacuum trended from negative 1.4 inches of water to positive 0.1 inches of water over the 24-hour run. PSEG Nuclear documented this condition under notification 20045454, and performed maintenance and retesting under work order 60013407. The retest included running the engine and observing for proper vacuum conditions. However, PSEG Nuclear did not ensure that the retest was of sufficient length to ensure that the crankcase could sustain the required vacuum.

Crankcase vacuum is maintained in the engine to remove combustible gases and therefore reduce the probability of a crankcase explosion. Loss of crankcase vacuum can be caused by a failure of the vacuum eductor or by excessive blowby from the engine cylinder combustion chamber past the piston compression rings that exceed the eductor capacity to remove the gases from the crankcase.

If left uncorrected, the failure to maintain a crankcase vacuum could result in a more significant safety concern, in this case, a crankcase explosion. The safety significance of this finding was very low, because the resultant investigation and operability determination, completed in February 2002 (evaluation 70022594), determined that the engine was not experiencing excessive blowby. Additionally, PSEG Nuclear determined that the engine did not exhibit any mechanical conditions that could generate the temperatures required to initiate a crankcase explosion.

10 CFR 50, Appendix B, Criterion XVI, *Corrective Actions*, requires that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective materials and equipment and nonconformances are promptly identified and corrected. Contrary to the above, PSEG Nuclear did not establish adequate measures to assure that the degraded crankcase vacuum condition that existed on October 30, 2000, was promptly identified and corrected. However, because the violation is of very low significance (Green) and PSEG Nuclear entered the deficiency into their corrective action system (notification 20089428), this finding is being treated as a non-cited violation, consistent with Section VI.A of the Enforcement Policy, issued May 1, 2000 (65FR25368).
(NCV 50-354/01-12-01)

R22 Surveillance Testing

.1 B EDG Lube Oil Strainer High Differential Pressure

a. Inspection Scope

The inspectors reviewed the results of the failed B EDG 24-hour operability test that was conducted on January 23, 2002, and the subsequent retest of the B EDG that was conducted on January 24, 2002. In addition, the inspectors assessed PSEG Nuclear's corrective actions relative to the lube oil (LO) strainer and crankcase vacuum degraded conditions associated with the B EDG.

b. Findings

The inspectors identified a non-cited violation for PSEG Nuclear's failure to establish adequate foreign material exclusion (FME) controls during B EDG maintenance in the fall 2001 refueling outage (RF10). The safety significance of this finding was very low, because PSEG Nuclear's resultant operability determination determined that the B EDG was operable and capable of performing its safety function.

On January 23, 2002, approximately 20 hours into the 24-hour run of HC.OP-ST.KJ-0015, EDG 1BG400 - 24 Hour Operability Run and Hot Restart, PSEG Nuclear secured

from the test due to a high LO strainer D/P. The strainer D/P increased from approximately 7 psid at the start of the test to 15 psid over the 20 hours. PSEG Nuclear changed the strainer and filter elements, successfully repeated the 24 hour surveillance test on January 24, 2002, and declared the engine operable.

During the investigation into the cause of the high LO strainer D/P, PSEG Nuclear determined that the LO strainer D/P had experienced a step-change from approximately 3 psid, prior to RF10, to approximately 7 psid when the engine was run immediately after the outage. PSEG Nuclear had failed to recognize and take action for this trend.

Following the failed test PSEG Nuclear sent LO samples along with a strainer and filter element to Maplewood Labs for further evaluation. On or about February 7, 2002, PSEG Nuclear received notification from the lab that indicated the samples contained man-made fibers. Based on this information, PSEG Nuclear concluded that the most likely cause of the LO strainer loading was the introduction of a foreign material into the LO sump during the outage and initiated corrective actions under notification 20090946. PSEG Nuclear evaluated this condition under an operability evaluation (order number 70022594) and presented the findings to the Station Operations Review Committee (SORC). SORC concluded that the engine was operable but degraded.

PSEG Nuclear also evaluated the B EDG with respect to its ability to perform its safety function from the time of the RF10 maintenance until the time of discovery (evaluation 70022594, activity 70). On February 15 PSEG Nuclear determined that the B EDG could have operated for greater than 24 hours and performed its safety function if the 24-hour test had not been aborted due to the strainer loading concern. This determination was based on a 24 hour mission time for the EDGs and the estimated time before the vendor specified strainer design D/P (20 psid) would be reached (an estimated 32.5 hours).

The failure to maintain adequate FME controls during EDG maintenance was more than minor because it could have resulted in a more significant safety concern (potential EDG inoperability). Based on the B EDG's continued operability in this circumstance, the finding is characterized as Green by the SDP Phase 1 screening.

In addition, the inspectors determined that PSEG Nuclear's initial corrective actions were appropriate, however, their followup corrective actions were not prompt and thorough with respect to evaluating the continued operability of the B EDG. The inspectors noted that: (1) PSEG Nuclear did not send out the quarantined material (LO strainer elements, LO filter elements, and two LO samples) for lab analysis until eight days after the event following inspector prompting; and (2) lab analysis results of a LO sample taken during the post-strainer replacement 24-hour EDG run were not thoroughly evaluated by PSEG Nuclear engineers. In addition, PSEG Nuclear identified that they had missed an opportunity to identify the adverse trend in strainer D/P during monthly EDG runs in November and December 2001.

TS 6.8.1 requires that written procedures shall be established, implemented and maintained covering the activities recommended in Appendix A of Regulatory Guide 1.33. Regulatory Guide 1.33 requires that procedures be developed for performing maintenance. PSEG Nuclear procedure SH.MD-AP.ZZ-0052, *Foreign Material*

Exclusion, specifies the requirements for establishing and maintaining FME controls during work activities. The failure to properly maintain adequate FME controls in accordance with SH.MD-AP.ZZ-0052 is a violation. However, because the violation is of very low significance (Green) and PSEG Nuclear entered the deficiency into their corrective action system (notifications 20089940 and 20090946), this finding is being treated as a non-cited violation, consistent with Section VI.A of the Enforcement Policy, issued May 1, 2000 (65FR25368). **(NCV 50-354/01-12-02)**

.2 Routine Testing

a. Inspection Scope

The inspectors observed portions of and reviewed the results of the HPCI quarterly in-service test. The inspectors reviewed the results of the TS 4.4.1.2 reactor recirculation jet pump operability surveillance and the TS 4.4.1.3 reactor recirculation loop flow mismatch verification in response to potential jet pump performance problems (notifications 20089334 and 20089453). The inspectors reviewed the test procedures to verify that applicable system requirements for operability were incorporated correctly into the test procedures, test acceptance criteria were consistent with the TS and UFSAR requirements, and the systems were capable of performing their intended safety functions. The inspectors also reviewed other notifications concerning problems encountered during surveillance testing (20087561, 20087582, 20087839, 20088130, 20088279, 20088498, 20089100, 20089951, 20089989, 20090197, 2000755, and 20090779).

The inspectors reviewed the following documents:

- *HPCI Main and Booster Pump Set - OP204 and OP217 - Inservice Test* (HC.OP-IS.BJ-0001)
- *High Pressure Coolant Injection System Valves - Inservice Test* (HC.OP-IS.BJ-0101)
- *Recirculation Jet Pump Operability - Daily* (HC.OP-ST.BB-0001), dated 1/18/02, 1/19/02, and 1/20/02

b. Findings

No findings of significance were identified.

R23 Temporary Plant Modifications**a.** Inspection Scope

The inspectors reviewed notification 20090587 associated with a temporary plant modification deficiency.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY**Occupation Radiation Safety [OS]****OS1** Access Control**a.** Inspection Scope

The inspector identified exposure significant work areas (e.g., high radiation areas and potential airborne radioactivity areas) in the turbine, radwaste and reactor buildings and reviewed associated controls and surveys of these areas to determine if the controls (i.e., radiological surveys, postings, barricades) were adequate to identify and control radiation exposures. The inspector observed health physics activities associated with the scram discharge headers and control rod drive accumulator change-out. For these areas the inspector: reviewed radiological job requirements and attended job briefings; determined if radiological conditions in the work area were adequately communicated to workers through briefings and postings; verified the implementation of radiological job coverage and contamination controls; and verified the accuracy of surveys and applicable posting and barricade requirements. The inspector determined if prescribed radiation work permit (RWPs) controls were in-place, procedure and engineering controls were in place, whether surveys and postings were complete and accurate, and whether air samplers were properly located. The inspector reviewed electronic pocket dosimeter alarm set points (both integrated dose and dose rate) for conformity with survey indications and plant policy. Hope Creek TS 6.12 and the requirements contained in 10 CFR 20, Subpart G were utilized as the standard for necessary barriers.

The inspector also reviewed six problem reports related to access control to radiologically significant areas (20089810, 20083050, 20080738, 20081065, 20081127, and 20081129).

b. Findings

No findings of significance were identified.

OS2 ALARA Planning and Controls

a. Inspection Scope

The inspector reviewed ALARA job evaluations, reviewed exposure estimates and exposure mitigation requirements, and reviewed ALARA plans. The inspector conducted a review of: the integration of ALARA requirements into work procedures and RWP documents; the accuracy of person-hour estimates and person-hour tracking; and the generation of shielding requests including their effectiveness in dose rate reduction.

For the work areas identified in Section 2OS1 (above), the inspector: evaluated PSEG Nuclear's use of engineering controls to achieve dose reductions; determined if workers utilized the low dose waiting areas and were effective in maintaining their doses ALARA; determined if workers received appropriate on-the-job supervision to ensure ALARA requirements were met; and reviewed individual exposures of selected work groups.

The inspector conducted a review of actual exposure results versus initial exposure estimates including comparison of estimated and actual dose rates and person-hours expended; determination of the accuracy of estimations to actual results; and determination of the level of exposure tracking detail, exposure report timeliness and exposure report distribution. The review was against requirements contained in 10 CFR 20.1101(b).

The inspector reviewed the ALARA goal established for 2001 (202.5 person-rem) and compared this goal to actual plant results (154.68 person-rem, utilizing fourth quarter 2001 results from electronic dosimetry measurements), including the Fall 2001 refueling outage (RF10). The inspector also reviewed exposure goals established for 2002 (55.55 person-rem).

The inspector also reviewed three problem reports related to maintaining occupational radiation exposures ALARA (20084077, 20090274, and 20084078).

b. Findings

No findings of significance were identified.

OS3 Radiation Monitoring Instrumentation

a. Inspection Scope

The inspector reviewed field instrumentation utilized by health physics technicians and plant workers to measure radioactivity, including portable field survey instruments, friskers, portal monitors, and small article monitors. The inspector conducted a review of instruments observed, specifically verification of calibration, proper function and certification of appropriate source checks for these instruments, which were utilized to ensure that occupational exposures were maintained in accordance with 10 CFR 20.1201.

The inspector also examined the committed effective dose equivalent (CEDE) exposure results for workers who sustained intakes of radioactive materials during calendar year 2001 (no results above PSEG Nuclear's reporting level of 12.5 millirem [5 DAC-hours]) and reviewed the total effective dose equivalent (TEDE) exposure results for all workers during calendar year 2001.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES [OA]

OA1 Performance Indicator Verification

.1 Emergency AC Power System Unavailability

a. Inspection Scope

The inspectors reviewed the methods used to calculate the PI on *Safety System Unavailability, Emergency AC Power System*, and reviewed the PI data for the period January 1, 2001, through December 31, 2001. The inspectors reviewed limiting condition for operation logs, control room operating logs, Licensee Event Reports (LERs) for 2001, and MR electronic data bases.

b. Findings

No findings of significance were identified.

.2 High Pressure Coolant Injection System Unavailability

a. Inspection Scope

The inspectors verified the methods used to calculate the *High Pressure Coolant Injection System Unavailability* PI and reviewed the data for the period January 1, 2001, through December 31, 2001. The inspectors reviewed limiting condition for operation logs, control room operating logs, LERs for 2001, and MR electronic data bases.

b. Findings

No findings of significance were identified.

OA2 Identification and Resolution of Problems

Inspection findings in previous sections of this report also had implications regarding PSEG Nuclear's identification, evaluation, and resolution of problems, as follows:

- Section 1R19 - PSEG Nuclear failed to establish adequate corrective actions to assure that the degraded crankcase vacuum condition that existed on October 30, 2000, was promptly identified and corrected.

- Section 1R22.1 - PSEG Nuclear's initial corrective actions were appropriate, however, their followup corrective actions were not prompt and thorough with respect to evaluating the continued operability of the B EDG. In addition, PSEG Nuclear identified that they had missed an opportunity to identify the adverse trend in strainer D/P during monthly EDG runs in November and December 2001.

Additional items associated with PSEG Nuclear's corrective action program were reviewed without findings and are listed in Sections 1R04, 1R05, 1R11, 1R12, 1R13, 1R14, 1R15, 1R16, 1R22, 2OS1, and 2OS2 of this report.

OA3 Event Follow-up

(Closed) Special Report 354/2001-009-00: Potential to Exceed Licensed Power Level Due to Inaccurate Feedwater Temperature Calibration. Due to a non-conservative feedwater temperature input to the core thermal power (CTP) calculation, Hope Creek potentially operated at power levels in excess of 100 percent of rated power as stated in License Condition 2.C (1). PSEG Nuclear determined that the magnitude of the impact (0.06 percent CTP) was such that nuclear instrumentation calibration would not be affected and there was no impact on core operating limits as reactor power was maintained within power measurement uncertainties. PSEG Nuclear captured this issue in their corrective action program as notification 20083782. This failure to ensure operation within License Condition 2.C (1) constitutes a violation of minor significance and is not subject to formal enforcement action in accordance with Section IV of the NRC's Enforcement Policy.

OA4 Cross-cutting Issues

The failure to establish adequate FME controls during B EDG maintenance conducted in the Fall 2001 refueling outage (RF10) directly involved human performance. (Section 1R22.1)

OA6 Management Meetings

Exit Meeting Summary

On February 13 the inspectors presented their overall findings to members of PSEG Nuclear management led by Mr. Dave Garchow. On February 15 PSEG Nuclear provided additional information relative to the B EDG LO issue. Based on this information, the inspectors completed the B EDG SDP evaluation and presented their associated findings to members of PSEG Nuclear management led by Mr. John Carlin on February 20. PSEG Nuclear management stated that none of the information reviewed by the inspectors was considered proprietary.

**ATTACHMENT
SUPPLEMENTAL INFORMATION**

a. Key Points of Contact

Denise Boyle, MR Engineer
 Ken Buddenbohn, Nuclear Licensing Engineer
 John Cichello, Performance Engineer
 Matt Conroy, MR Supervisor
 Mike Dammann, Maintenance Manager - Controls & Power Distribution
 Ali Fakhar, Reliability Programs Manager
 Robert Gary, Radiation Protection Operations Superintendent
 Jim Hughs, Reliability Performance Engineering Supervisor
 Alan Johnson, MR Program Supervisor
 Kurt Krueger, Operations Manager
 Kevin O'Hare, Acting Radiation Protection Manager
 Mark Pfizenmair, Performance Engineer
 Devon Price, Assistant Operations Manager
 Gabor Salamon, Nuclear Safety & Licensing Manager
 Larry Wagner, Director - Site Work Integration & Management
 Mike Welker, Performance Engineer
 Suzanne Ziegler, ALARA Supervisor

b. List of Items Opened, Closed, and Discussed

Opened/Closed

50-354/01-12-01	NCV	PSEG Nuclear did not establish adequate corrective actions to assure that the degraded crankcase vacuum condition that existed on October 30, 2000, was promptly identified and corrected. (Section R19)
50-354/01-12-02	NCV	Failure to establish adequate FME controls during B EDG maintenance conducted in the Fall 2001 refueling outage (RF10). (Section R22.1)
50-354/01-09-00	Special Report	Potential to exceed licensed power level due to an inaccurate feedwater temperature calibration. (Section 4OA3)

List of Documents Reviewed

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

Hope Creek Generating Station (HCGS) Updated Final Safety Analysis Report
 Technical Specification Action Statement Log (SH.OP-AP.ZZ-108)
 HCGS NCO Narrative
 HCGS Plant Status Report
 Weekly Reactor Engineering Guidance to Hope Creek Operations
Failed Open Safety/Relief Valve (HC.OP-AB.ZZ-0121)
 NRC Bulletin 74-14, *BWR Relief Valve Discharge to Suppression Pool Shift Technical Advisor Program* (SH.OP-AS.ZZ-0002)

d. List of Acronyms

ALARA	As Low As Is Reasonably Achievable
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
CTP	Core Thermal Power
DAC	Derived Air Concentration
D/P	Differential Pressure
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
FME	Foreign Material Exclusion
HCGS	Hope Creek Generating Station
HCEP	Hope Creek Expert Panel
HPCI	High Pressure Coolant Injection
LER	Licensee Event Report
LO	Lube Oil
MR	Maintenance Rule
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OE	Operating Experience
PARS	Publicly Available Records
PMT	Post Maintenance Testing
PSEG	Public Service Electric Gas
RCIC	Reactor Core Isolation Cooling
RF10	Refueling Outage No. 10
RWP	Radiation Work Permit
SDP	Significance Determination Process
SORC	Station Operations Review Committee
SSC	Structure, System, and Component
SW	Service Water
TARP	Transient Assessment Response Plan
TEDE	Total Effective Dose Equivalent
TI	Temporary Instruction
TS	Technical Specification