April 12, 2001

Mr. Harold W. Keiser
Chief Nuclear Officer and President
PSEG Nuclear LLC - X04
P. O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: HOPE CREEK NUCLEAR GENERATING STATION - NRC INSPECTION REPORT 05000354/2001-004

Dear Mr. Keiser:

On March 31, 2001, the NRC completed an inspection of your Hope Creek facility. The enclosed report presents the results of that inspection. The preliminary findings were presented to PSEG management led by Mr. Dave Garchow in an exit meeting on April 5.

NRC inspectors examined numerous activities as they related to reactor safety and compliance with the Commission's rules and regulations, and with the conditions of your license. The inspection consisted of selective review of procedures and representative records, observations of activities, and interviews with personnel. Specifically, this inspection involved seven weeks of resident inspection and one region-based radiological performance indicator inspection.

The inspectors identified one issue of very low safety significance (Green) regarding the qualification of a fire damper. The issue was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because it has been entered into your corrective action program, the NRC is treating this issue as a Non-Cited Violation (NCV), 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; and the NRC Resident Inspector at the Hope Creek facility.

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Sincerely,

/RA/

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

Enclosure: Inspection Report 05000354/2001-004

Attachment: Supplemental Information

cc w/encl:
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M. Bezilla, Vice President - Technical Support
D. Garchow, Vice President - Operations
G. Salamon, Manager - Licensing
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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No:	50-354
License No:	NPF-57
Report No:	05000354/2001-004
Licensee:	PSEG Nuclear LLC
Facility:	Hope Creek Nuclear Generating Station
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Dates:	February 11 - March 31, 2001
Inspectors:	J. G. Schoppy, Jr., Senior Resident Inspector J. T. Furia, Senior Health Physicist R. S. Barkley, Senior Project Engineer C. G. Cahill, PE, Resident Inspector S. M. Pindale, Reactor Inspector
Approved By:	Glenn W. Meyer, Chief, Projects Branch 3 Division of Reactor Projects

Summary of Findings

IR 05000354-01-04, on 2/11 - 3/31/01, Public Service Electric Gas Nuclear LLC, Hope Creek Generating Station. Fire Protection.

The inspection was conducted by resident inspectors, a regional reactor inspector, a regional project engineer, and a regional radiation specialist. This inspection identified one Green issue, which was also a non-cited violation. 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 fire damper configuration which did not provide a three-hour rated fire barrier between redundant shutdown equipment trains. A fire damper was installed in a gypsum board wall (both three-hour rated components), but PSEG Nuclear could not demonstrate that the installed damper/barrier configuration had been properly qualified as three-hour rated.

  The safety significance of this finding was very low because of the availability of detection, automatic suppression, and manual fire fighting capability. This finding represented a non-cited violation for failure to comply with the facility license regarding the fire protection program.

B. Licensee Identified Findings

The inspectors reviewed one violation of very low significance which was identified by PSEG Nuclear. PSEG Nuclear corrective actions, taken or planned, appeared reasonable. This violation is listed in Section 40A7 of this report.

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Report Details

SUMMARY OF PLANT STATUS

The Hope Creek plant operated continuously at or near full power for the duration of the inspection period with the following exceptions: (1) a planned power reduction on March 4 for turbine valve testing, (2) a short duration reduction to 87 percent power on March 10 to recover a scrammed rod (rod 46-35), and (3) an emergent power reduction to 65 percent on March 31 in response to high solar magnetic disturbance (SMD). The SMD induced power reduction occurred shortly before a scheduled power reduction to 70 percent for a rod pattern adjustment. Following the rod pattern adjustment on March 31, operators maintained the unit at 80 percent power until April 2 due to the projected solar activity.

1. REACTOR SAFETY
(Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity)

R04 Equipment Alignment

a. Inspection Scope

The inspectors performed equipment alignment verifications on redundant equipment during system outages of B emergency diesel generator (EDG) and the reactor core isolation cooling (RCIC) system. The inspectors verified by plant walkdowns and main control room tours that the planned equipment outages did not adversely affect the redundant components. The inspectors also verified that the B EDG and RCIC system were restored to an operable condition after the planned maintenance was completed. Additionally, the inspectors reviewed various corrective action notifications associated with equipment alignment deficiencies (20055930, 20056518, 20056688, 20056952, 20057119, 20057398, 20057447, 20058004, and 20059111).

b. Issues and Findings

No findings of significance were identified.

R05 Fire Protection

a. Inspection Scope

The inspectors performed walkdowns of the control room, the fire pump house and electrical access area rooms 5301 and 5339 . 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 (20056390, 20056445, 20056779, 20057663, 20057881, 20059110, 20060741, 20061061).

b. Issues and Findings

The inspectors identified a non-cited violation for the failure to provide a three-hour rated fire barrier separating fire areas AB1 and AB2 (diesel/control building elevation 102'). The finding is characterized as Green by the SDP.

Specifically, fire damper configuration 1FPGKD263D2 was comprised of six Ruskin model NIBD-23 dampers installed within a gypsum board wall. Although the gypsum board wall alone and the dampers installed in a concrete wall are qualified as 3-hour rated fire barriers, PSEG Nuclear could not demonstrate that the installed damper/barrier configuration was properly qualified as a 3-hour rated assembly. The inspectors evaluated the defense-in-depth (DID) elements on both sides of the barrier and also reviewed the fire loading and fire impairments. The inspectors also reviewed the PSEG Nuclear evaluation conducted under notification 20060147 which established that a 2-hour rated barrier, as qualified by Underwriters Laboratory (UL) test R13479, was demonstrated for these dampers installed in a gypsum board wall. The inspectors also identified a similar damper configuration between rooms 5207 and 5237 (diesel/control building elevation 77'). Fire protection engineers planned to evaluate this condition under notification 20060147.

The finding had a credible impact on safety due to the size of the damper opening (approximately six foot by four foot), the potential extent of condition, the relative risk significance of the fire area, moderate combustible loading in room 5301(as described in Appendix 9A of the HCGS UFSAR), and a credible ignition source (4KV bus ducts). A 3-hour fire barrier separating redundant safe shutdown functions was affected necessitating a Phase 2 SDP. The risk screening was a conservative estimate made by assuming that adequate intervening combustibles existed to allow a fire to propagate throughout the barrier. A quantification of degradation ratings (DR) of the individual DID elements resulted in a DR of -3.25 (medium degradation of the fire dampers: DR = -1, no known degradation in automatic suppression in room 5339: DR = -1.25, and no known degradation in manual fire fighting capability: DR = -1). There was no adjustments made for dependencies between DID elements or common cause contributions (between sprinkler systems and manual hose stations.) Based on the HCGS IPEEE, a fire ignition frequency of 6.5E-04 was used. These factors resulted in a fire mitigation frequency of -6.4 and a delta core damage frequency (CDF) of less than 10^{-6}. The condition existed for more than 30 days. Based on the resultant estimated likelihood rating (G), the finding is characterized as Green by the SDP.

Hope Creek Facility Operating License Condition 2.C.7 requires PSEG Nuclear to implement and maintain all provisions of the approved fire protection program as described in the final safety analysis report. Appendix 9A of the HCGS UFSAR, *Appendix R Comparison*, states that HCGS maintains Appendix R separation between two shutdown trains. Appendix R Section III.G.2 requires that separation of redundant trains shall be provided by (1) a fire barrier having a 3-hour rating, or (2) separation by not less than 20 feet horizontal distance plus automatic suppression and detection, or (3) a fire barrier having a 1-hour rating plus automatic suppression and detection. Section 9.5.1.6.3.2 states that fire barriers that separate safe shutdown areas are provided with fire dampers of equivalent fire ratings in penetration openings for ventilation systems. Contrary to the above, PSEG Nuclear could not demonstrate that

the installed damper configuration was qualified for 3 hours. However, because the violation is of very low significance and PSEG Nuclear entered the deficiency into their corrective action system (notification 20060147), this finding is being treated as a non-cited violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65FR25368). **(NCV 05000354/2001-004-01)**

R06 Flood Protection Measures

a. Inspection Scope

The inspectors reviewed several notifications involving flood protection (20056973, 20057249, 20057252, and 20058821).

b. Issues and Findings

No findings of significance were identified.

R12 Maintenance Rule Implementation

a. Inspection Scope

The inspectors reviewed all corrective action notifications initiated from November 9 to December 31, 2000, for Maintenance Rule screening. The inspectors further reviewed five notifications that included system engineer functional failure determinations (20048171, 20048184, 20048212, 20048394, and 20051592); one maintenance preventable functional failure evaluation (70012587); and four notifications involving PSEG Nuclear's implementation of their Maintenance Rule program (20047376, 20048374, 20049155 and 20051079). The inspectors reviewed an (a)(2) and an (a)(1) system health report (RCIC and extraction steam, vents and drains systems, respectively) and discussed system reliability and availability monitoring with the respective system engineers. The inspectors also reviewed Hope Creek Expert Panel Meeting Minutes (HCEP 01-001 and HCEP 01-002).

To assess PSEG Nuclear's implementation of 10CFR 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. Issues and 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 concurrent planned outage of A standby liquid control (SLC) pump, A core spray pump, and A service water (SW) pump; (2) the concurrent planned maintenance on B EDG, D switchgear ventilation fan, and 500KV switchyard breakers; and (3) the concurrent planned outage of RCIC and D SW pump. 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 during this maintenance. In addition, the inspectors reviewed other notifications involving risk assessment and emergent work (20056179, 20056476, 20056647, 20056791, 20057128, 20057144, 20057645, 20059873, 20059975, 20060066, and 20060503).

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. 162 - 168
- 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. Issues and Findings

No findings of significance were identified.

R14 Personnel Performance During Nonroutine Plant Evolutions

a. Inspection Scope

The inspectors reviewed operator and loss prevention personnel actions in response to an unexpected freon leak while restoring the A chiller (AK400) following planned maintenance (20056791). The inspectors reviewed the HCGS Event Classification Guide (ECG) and discussed ECG Section 9.4, *Toxic/Flammable Gases*, with the Operations Superintendent. The inspectors observed activities in support of a planned

replacement of several main generator exciter brushes. The inspectors also reviewed operator actions in response to an individual rod scram (rod 46-35) during reactor protection system testing on March 9 (20059083).

b. Issues and Findings

No findings of significance were identified.

R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed operability determinations involving C residual heat removal (RHR) pump motor oil leakage (20056179), B EDG load swings (20056959), and C EDG jacket water keep warm pump seal leakage (70015562). The inspectors evaluated PSEG Nuclear engineering's corrective actions in response to a 10CFR21 report concerning control devices installed on ABB medium voltage circuit breakers (20057512). 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.

b. Issues and 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 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*

b. Issues and Findings

No findings of significance were identified.

R17 Permanent Plant Modifications

a. Inspection Scope

On December 1, 2000, PSEG Nuclear submitted a request for increased power level to the NRC (LCR H00-05). Maintenance and engineering installed the improved feedwater flow instrumentation needed to support the power uprate. While awaiting NRC power uprate approval (in addition to environmental permit approval and a PJM interconnection agreement), PSEG Nuclear revised applicable operating procedures to use the more accurate feedwater flow instrumentation to provide improved measurement of thermal power level. The inspectors discussed the process modification with design engineers and plant operators, reviewed applicable procedure revisions, and observed implementation of the process modification through frequent review of available plant instrumentation. The inspectors verified that the design and licensing bases of existing plant systems were not degraded through the process modification.

The inspectors reviewed the following documents:

- *Power Uprate Project Plan (PLCM-1)*, Revision 0
- *Installation of Crossflow Meter for Flow Nozzle Correction (DCP 80010404) 10CFR50.59 Safety Evaluation*, Revision 1
- *Feedwater Crossflow IPTE Plan (01-001)*
- *Loss of 120 VAC Inverter* (HC.OP-AB.ZZ-0136)
- *Overhead Annunciator Window Box B3* (HC.OP-AR.ZZ-0007)
- *Review of Reactor Core Performance Information* (HC.OP-DD.ZZ-0020)
- *Log 3 Control Console Log Condition 1, 2 and 3* (HC.OP-DL.ZZ-0003)
- *Startup From Cold Shutdown to Rated Power* (HC.OP-IO.ZZ-0003)
- *Shutdown From Rated Power to Cold Shutdown* (HC.OP-IO.ZZ-0004)
- *Power Changes During Operation* (HC.OP-IO.ZZ-0006)
- *Feedwater System Operation* (HC.OP-SO.AE-0001)

b. Issues and Findings

No findings of significance were identified.

R19 Post Maintenance Testing

a. Inspection Scope

The inspectors witnessed post maintenance testing (PMT) and/or reviewed the test data for B EDG motor operated potentiometer, SLC system valve 1BHHV-F006A, and A SW pump maintenance. The inspectors reviewed NC.NA-TS.ZZ-0050, *Maintenance Testing Program Matrix,* and verified that the PMTs were adequate for the scope of maintenance performed. The inspectors also reviewed notifications concerning problems associated with PMTs (20056640, 20056912, 20058809, 20058975, 20059290, 20059546, and 20060087).

The inspectors reviewed the following document:

- *A Service Water Pump AP502 In-service Test* (HC.OP-IS.EA-0001)

b. Issues and Findings

No findings of significance were identified.

R22 Surveillance Testing

a. Inspection Scope

The inspectors observed portions of and reviewed the results of the B RHR pump in-service test (IST) and the A SLC pump IST. 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 updated final safety analysis requirements, and the systems were capable of performing their intended safety functions. The inspectors also reviewed notifications concerning problems encountered during surveillance testing (20056147, 20056162, 20056849, 20056959, 20070505, 20057065, 20058601, 20060236, 20060490, and 20060559).

The inspectors reviewed the following documents:

- *B Residual Heat Removal Pump In-service Test* (HC.OP-IS.BC-0003)

- *Standby Liquid Control Pump AP208 In-service Test* (HC.OP-IS.BH-0001)

b. Issues and Findings

No findings of significance were identified.

R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed notification 20058932 associated with PSEG Nuclear's long-term corrective actions for a reactor recirculation motor generator ventilation damper issue (TMOD 00-032).

b. Issues and Findings

No findings of significance were identified.

4. OTHER ACTIVITIES [OA]

OA1 Performance Indicator Verification

a. Inspection Scope

The inspector reviewed a listing of all PSEG Nuclear radiological problem reports for the period April 2, 2000, through March 18, 2001, for issues related to the *Occupational Exposure Control Effectiveness* performance indicator (PI). This PI measures non-conformances with high radiation areas greater than 1R/hr and unplanned personnel exposures greater than 100 mrem TEDE, 5 rem SDE, 1.5 rem LDE, or 100 mrem to the unborn child.

b. Issues and Findings

No findings of significance were identified.

OA2 Identification and Resolution of Problems

The inspection finding in Section 1R05 of this report also had implications regarding PSEG Nuclear's identification, evaluation, and resolution of problems, as follows:

- Failure to provide a three-hour rated fire barrier to ensure Appendix R separation between two shutdown trains. This demonstrated weak identification of a fire barrier configuration control deficiency.

Additional items associated with PSEG Nuclear's corrective action program were reviewed without findings and are listed in Sections 1R04, 1RO5, 1RO6, 1R12, 1R13, 1R14, 1R15, 1R16, 1R19, 1R22, 1R23, and 4OA7 of this report.

OA6 Management Meetings

Exit Meeting Summary

On April 5 the inspectors presented their overall findings to members of PSEG Nuclear management led by Mr. Dave Garchow. PSEG Nuclear management stated that none of the information reviewed by the inspectors was considered proprietary.

OA7 Licensee Identified Violations. The following finding of very low significance was identified by PSEG Nuclear and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a Non-Cited Violation (NCV):

> **NCV 05000354/2001-004-02:** 10 CFR 20.1602 requires measures to ensure that an individual is not able to gain unauthorized or inadvertent access to very high radiation areas. On February 28, 2001, during work in the spent fuel pool, a radiation protection technician issued a key utilized to gain access to a posted very high radiation area, without first having obtained approval of the radiation protection manager. Such an action is contrary to the requirements set forth in paragraph 5.2.8 of PSEG Nuclear procedure NC.RP-TI.ZZ-0203(Q). Radiation protection entered this issue into the PSEG Nuclear problem identification and corrective action system as notification 20057978; and indicated that they will report the condition as an Occupational Radiation Safety Performance Indicator item for the 1st Quarter 2001. No actual or potential safety consequence resulted and no unintended occupational exposure occurred due to this condition. This is being treated as a Non-Cited Violation.

ATTACHMENT 1

SUPPLEMENTAL INFORMATION

a. Key Points of Contact

Terry Cellmer, Radiation Protection Manager
Matt Conroy, Maintenance Rule Supervisor
Mike Dammann, Maintenance Manager - Controls & Power Distribution
Bob Gary, Acting Radiation Protection Operations Superintendent
Kurt Krueger, Operations Manager
K. O'Hare, ALARA Superintendent
Devon Price, Assistant Operations Manager
Gabor Salamon, Nuclear Safety & Licensing Manager
Lou Santilli, Production Engineering Manager
Jim Stavely, Engineering Supervisor - Hope Creek Reactor Engineering
Larry Wagner, Director - Site Work Integration & Management

b. List of Items Opened, Closed, and Discussed

Opened/Closed

050000354/2001-004-01	NCV	Failure to provide a three-hour rated fire barrier to ensure Appendix R separation between two shutdown trains. (Section 1RO5)
050000354/2001-004-02	NCV	Failure to control access to very high radiation areas. (Section 4OA7)

c. 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

d. List of Acronyms

CDF	Core Damage Frequency
DID	Defense-In-Depth
DR	Degradation Rating
ECG	Event Classification Guide
EDG	Emergency Diesel Generator
HCGS	Hope Creek Generating Station
IPTE	Infrequently Performed Test or Evolution
IST	In-Service Test
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PI	Performance Indicator
PMT	Post Maintenance Testing
PSEG	Public Service Electric Gas
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
SDP	Significance Determination Process
SLC	Standby Liquid Control
SMD	Solar Magnetic Disturbance
SW	Service Water
UFSAR	Updated Final Safety Analysis Report
UL	Underwriters Laboratory