

June 13, 2000

Mr. Harold W. Keiser  
President and Chief Nuclear Officer  
Public Service Electric & Gas Company  
Post Office Box 236  
Hancocks Bridge, NJ 08038

SUBJECT: NRC INSPECTION REPORT 05000354/2000-003

Dear Mr. Keiser:

On May 13, 2000, 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 May 19, 2000.

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 six weeks of resident inspection, and two region-based inspections of occupational radiation safety and inservice inspection.

The inspector identified one finding that was evaluated under the risk significance determination process and was determined to be of very low safety significance (Green). This finding has been entered into your corrective action program and is discussed in the summary of findings and in the body of the attached inspection report. Furthermore, the finding was determined to involve a violation of NRC requirements, but because of its very low safety significance, the violation is non-cited.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC Public Document Room and will be available on the NRC Public Electronic Reading Room (PERR) link at the NRC home page, <http://www.nrc.gov/NRC/ADAMS/index.html>.

Sincerely,

/RA/

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

Enclosure: Inspection Report 05000354/2000-003

Docket No. 05000354

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

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

Report No: 05000354/2000-003

Licensee: Public Service Electric and Gas Company

Facility: Hope Creek Nuclear Generating Station

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

Dates: April 2 - May 13, 2000

Inspectors: Joseph G. Schoppy, Jr., Senior Resident Inspector  
J. Dan Orr, Resident Inspector  
Joseph T. Furia, Senior Health Physicist  
Alfred Lohmeier, Reactor Inspector

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

## SUMMARY OF FINDINGS

### Hope Creek Generating Station NRC Integrated Inspection Report 05000354/2000-003

The report covers a six-week period of resident inspection and inspections of occupational radiation safety and inservice inspection by regional specialists using the guidance contained in NRC Inspection Manual Chapter 2515\*. The significance of issues is indicated by their color (Green, White, Yellow, or Red) and was determined by the Significance Determination Process in Inspection Manual Chapter 0609 (see Attachment 1).

#### **Cornerstone: Occupational Radiation Safety**

- Green. The inspector identified a posted high radiation area on the refueling floor which was not appropriately barricaded in accordance with Technical Specification 6.12.1. A portion of the area was not posted or barricaded, i.e., a three foot wide opening in the barricade existed in front of the step-off pad used to access the area. When informed, PSEG appropriately barricaded the area and entered the deficiency into their corrective action system as notification 20028576. This finding was treated as a non-cited violation. (Section 2OS1)

#### **Cross-cutting Issues: Human Performance**

- No Color. The inspectors noted that several shortcomings in work planning, configuration control, attention to detail, operator awareness, work control, and communication resulted in a technical specification non-compliance, three inadvertent engineered safety feature actuations, unexpected equipment alignments, and a bumped fuel bundle. Although these occurrences challenged the organization during the refueling outage, the problems involved very low shutdown risk, no consequential impact on the plant, and violations of minor significance. Collectively, the events highlighted weaknesses in work control during periods of high maintenance activity. In each case, the operations and maintenance departments documented the associated human performance issues within their corrective action process. (Section OA4)

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## Report Details

### **SUMMARY OF PLANT STATUS**

Prior to the planned shutdown for refueling outage No. 9 (RFO9) on April 22, the Hope Creek plant operated at or near full power except for a planned power reduction on April 8 to restore the A feedwater train. The plant remained shutdown for refueling through the end of the inspection period.

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

##### 1R04 Equipment Alignment

###### a. Inspection Scope

The inspectors performed equipment alignment verifications on redundant equipment during system outages on the A service water (SW) pump and the B emergency diesel generator (EDG). Additionally, the inspectors reviewed various corrective action notifications associated with equipment alignment deficiencies (20025395, 20025956, 20027516, 20028277, 20029127, and 20029578).

###### b. Issues and Findings

There were no findings identified.

##### 1R05 Fire Protection

###### a. Inspection Scope

The inspectors performed walkdowns of the control/diesel building 130' elevation (rooms 5401 and 3425) and the turbine building 102' elevation (rooms 1315, 1316 and 1317). These areas represent about five percent of the analyzed total core damage frequency due to fire. Additionally, the inspectors reviewed several notifications associated with fire protection deficiencies (20025684, 20025607, 20026031, 20026153, 20027184, and 20029468).

###### b. Issues and Findings

There were no findings identified.

##### 1R08 Inservice Inspection Activities

###### a. Inspection Scope

During RFO9 the inspector reviewed results of inservice inspection (ISI) program activities in accordance with ASME Boiler and Pressure Vessel Code Section XI. The inspector focused on the safety significant barrier integrity cornerstone inspectable area, including the reactor pressure vessel (RPV) shell, RPV internal components, and the RPV containment shell structure.

The inspector reviewed the ultrasonic test (UT) examination of two meridional closure head welds, and in-vessel visual inspection (IVVI) of the jet pump assembly, steam

separator bolts, steam dryer mid-support ring welds, core spray header bracket welds, and downcomer welds. The inspector observed portions of the RPV containment IVVI video tapes. Inspection results were reviewed to determine whether the inspections were performed in accordance with approved contractor procedures, and the rules of ASME Boiler and Pressure Vessel Code Section XI for ultrasonic and visual inspection. The inspector reviewed the NRC safety evaluation and authorization (pursuant to 10 CFR 50.55a(a)(3)(i)) of the PSEG proposal to eliminate the augmented inspection of RPV circumferential welds from the 10 year ISI program. The inspector reviewed documentation and disposition of material degradation found by PSEG examiners during RFO9. The inspector also reviewed selected contractor Level III NDE personnel qualifications, certifications, and training to determine whether contracted inspectors were qualified for the inspections performed.

The inspector reviewed results of the 1997 code repair of the N5B core spray nozzle to safe-end weld leak using weld overlay, and the effectiveness of the repair as found from UT of the repaired weld during RFO9 to ascertain that the existing acceptable flaws remaining in the nozzle safe-end material after repair had not grown and propagated into the over-lay weld material to form leak paths through the safe-end wall. The inspector reviewed the advanced automated ultrasonic inspection software and hardware used to improve characterization of defects in the core spray nozzle to safe-end welds otherwise not detected by conventional UT methods.

b. Issues and Findings

There were no findings identified.

1R12 Maintenance Rule Implementation

a. Inspection Scope

The inspectors reviewed corrective action notifications initiated in January 2000 for maintenance rule screening. The inspectors further reviewed three notifications that involved system engineer functional failure determinations: 20018684 - reactor water cleanup system relief valve failure, 20018918 - safety auxiliaries cooling system Rosemount transmitter failure, and 20018968 - south plant vent sample flow failure.

b. Issues and Findings

There were no findings identified.



### 1R13 Maintenance Risk Assessments and Emergent Work Control

#### a. Inspection Scope

The inspectors evaluated on-line risk management for work week No. 117 which included A SW pump and A EDG outages and an A standby liquid control test. The inspectors evaluated PSEG's control of emergent work on the B EDG voltage regulator. In addition, the inspectors reviewed notifications involving risk assessment and emergent work (20025588, 20025872, 20026134, 20027041, and 20027582).

#### b. Issues and Findings

There were no findings identified.

### 1R14 Personnel Performance During Nonroutine Plant Evolutions

#### .1 Unit Shutdown For Refueling Outage

##### a. Inspection Scope

The inspector observed selected portions of the control room staff performing down-power activities related to the reactor shutdown to begin RFO9. These activities included the pre-evolution briefing, operators inserting negative reactivity by reducing flow and by inserting control rods, and operators removing the B reactor feed pump from service. The inspector reviewed the shutdown procedure to ascertain operator compliance and conformance to the procedure.

##### b. Issues and Findings

There were no findings identified.

#### .2 Temporary Air Compressor Fire

##### a. Inspection Scope

On May 9 maintenance technicians reported a fire in a temporary air compressor outside the turbine building. The temporary air compressor was operating in parallel with another temporary air compressor providing plant service and instrument air during the outage. The inspector responded to the control room and observed operator actions to minimize the impact to operating plant equipment, the radio communications between responding personnel, and the recovery actions. Fire prevention personnel reported the fire had been extinguished within four minutes. The inspector toured the fire scene and observed fire prevention response.

##### b. Issues and Findings

There were no findings identified.

### 1R16 Operator Workarounds

a. Inspection Scope

The inspectors reviewed the operator work-around list, corrective action notifications, operator logs, and instrument panel status to evaluate potential impacts on the operators' ability to implement abnormal or emergency operating procedures.

b. Issues and Findings

There were no findings identified.

1R19 Post Maintenance Testing

a. Inspection Scope

The inspectors reviewed the results of post maintenance tests associated with the B core spray pump minimum flow test valve, the B EDG 18-month PM, and the 125Vdc 1E battery replacements. The inspectors also reviewed notifications concerning problems associated with post maintenance testing (20029293, 20029542, 20029633, and 20029673).

b. Issues and Findings

There were no findings identified.

1R20 Refueling and Outage Activities

a. Inspection Scope

Prior to the outage the inspectors reviewed the design analysis for the float charging of the 1E 125Vdc replacement batteries, pre-staged in the diesel control building, with respect to hydrogen generation and control. During the outage the inspectors performed numerous verifications of shutdown cooling flow paths, spent fuel pool cooling, offsite power availability, containment integrity, and equipment tagging. The inspectors evaluated PSEG's shutdown risk management and configuration control. The inspectors observed fuel handling activities from the refueling bridge and the control room. The inspectors also reviewed notifications concerning problems associated with outage activities (20025219, 20025645, 20026607, 20027612, 20029296, and 20029508).

b. Issues and Findings

There were no findings identified.

## 1R22 Surveillance Testing

### a. Inspection Scope

The inspectors observed portions of and reviewed the results of the reactor core isolation cooling (RCIC) system time response test, the B EDG LOP/LOCA surveillance, the A & C core spray pumps inservice test, and several local leak rate tests (chill water valve GDV-243, containment atmosphere control valve 1GSHV-4956, and the A outboard main steam isolation valve). The inspectors also reviewed notifications concerning problems encountered during surveillance testing (20025450, 20025462, 20027154, 20027362, 20028288, 20029024, 20029275, 20029411, and 20029532).

### b. Issues and Findings

There were no findings identified.

## 1R23 Temporary Plant Modifications

### a. Inspection Scope

The inspectors reviewed temporary modifications TM-00-10 and TM-00-11. These modifications installed an inflatable plug in the B SW inlet piping and a blank flange on the B SW loop emergency overboard diffuser, respectively. Engineering initiated the modifications to maintain secondary containment while the B SW loop was drained for maintenance. The inspectors also performed a walkdown of these modifications.

### b. Issues and Findings

There were no findings identified.

## 2. **RADIATION SAFETY**

### **Occupation Radiation Safety [OS]**

## 2OS1 Access Control

### a. Inspection Scope

The inspector reviewed the access control program by examining the controls established for exposure significant areas, including postings, markings, control of access, dosimetry, surveys and alarm set points. Areas selected were located throughout the radiologically controlled area (RCA), including the turbine, waste and services and reactor buildings, and included the refueling floor and drywell.

Job performance observations were conducted to evaluate radiation worker performance with respect to radiation protection work guidance and included verification of radiological controls, such as adequacy of surveys and radiation protection technician coverage.

b. Issues and Findings

The inspector identified a posted high radiation area on the refueling floor, around the stored reactor vessel head, which was not appropriately barricaded in accordance with plant Technical Specification 6.12.1. Technical Specification 6.12.1. applies to high radiation areas with dose rates in excess of 100, but less than 1000 millirem per hour at 30 centimeters from the source. Such areas are required to be conspicuously posted and barricaded. Contrary to this requirement, a portion of the area was not posted or barricaded, i.e., a three foot wide opening in the barricade existed in front of the step-off pad used to access the area. When informed, radiation protection personnel promptly posted and barricaded the area as required by technical specifications and entered the deficiency into their corrective action system as notification 20028576.

The finding affects the Occupational Radiation Cornerstone, because the absence of a radiation barrier that could have resulted in significant unintended worker dose. In this case, no personnel were overexposed and there was no substantial potential for exposure in excess of regulatory limits. Further, all personnel who would have access to the area were provided with TLD and self-alarming electronic dosimetry. Accordingly, there was no compromise in the PSEG's ability to assess dose. Consequently, there was very low safety significance (Green) associated with this finding when evaluated under the Occupational Radiation Safety Significance Determination Process (SDP). This Technical Specification violation is being treated as a non-cited violation, consistent with Section VI.A of the Enforcement Policy, issued on May 1, 2000 (65FR25368) **(NCV 05000354/2000-003-001)**

2OS2 ALARA Planning and Controls

a. Inspection Scope

The inspector reviewed work performance during the current refueling outage (RF09). The inspector reviewed the five highest exposure jobs that were in-progress or completed during this inspection period: (1) reactor disassembly; (2) core alterations/fuel movement; (3) undervessel reactor instrumentation; (4) control rod drive change-out; and (5) local leak rate testing. Areas reviewed for these five jobs included an evaluation of the use of engineering controls to achieve dose reduction, review of the use of low dose waiting areas, review of on-job supervision provided to workers, and a review of individual exposures from selected work groups.

The inspector observed radiation workers and radiation protection technicians during high dose rate and/or high exposure jobs, such as those listed above, to determine if the training/skill level was sufficient with respect to the radiological hazards. Additionally, the inspector examined the assumptions and basis for the various job estimates, including the methodology utilized for estimating job-specific exposures.

b. Issues and Findings

There were no findings identified.

**4. OTHER ACTIVITIES [OA]**

OA2 Identification and Resolution of Problems

An inspection finding in a previous section of this report also had implications regarding PSEG's identification, evaluation, and resolution of problems, as follows:

- Section 2OS1 - Failure to properly barricade a posted high radiation area. This demonstrated weak identification of a radiological control posting problem.

Additional items associated with PSE&G's corrective action program were reviewed without findings and are listed in Sections 1R04, 1R05, 1R12, 1R13, 1R16, 1R19, 1R20, and 1R22 of this report.

OA4 Cross-cutting Issues

a. Inspection Scope

The inspectors reviewed the following notifications associated with unexpected equipment actuations or alignments during the outage resulting from human performance deficiencies:

- notification 20028414 - Fuel bundle bumped cattle chute during offload
- notification 20028994 - Scram occurred on high SDV level
- notification 20029034 - Inadvertent SLC initiation
- notification 20029127 - TS 3.3.2, Action 26, not met
- notification 20029578 - Inadvertent jumper installed in panel
- notification 20029578 - Unplanned start of HPCI auxiliary oil pump
- notification 20029618 - Scram occurred on high SDV level

b. Issues and Findings

The inspectors noted that several shortcomings in work planning, configuration control, attention to detail, operator awareness, work control, and communication resulted in a technical specification non-compliance, three inadvertent engineered safety feature actuations, unexpected equipment alignments, and a bumped fuel bundle. Although these occurrences challenged the organization during the refueling outage, the problems involved very low shutdown risk, no consequential impact on the plant, and

violations of minor significance. Collectively, the events highlighted weaknesses in work control during periods of high maintenance activity. In each case, the operations and maintenance departments identified and documented the associated human performance issues within their corrective action process.

OA5 Other

(Open/Closed) LER 354/2000-002-00: Failure to meet technical specification (TS) surveillance requirement to perform channel check of main steam isolation valve sealing system instrumentation. This LER discussed an operator error in the preparation and review of the daily surveillance log package. One page was inadvertently left out of the pre-prepared log package. Following operator identification, operators completed TS surveillance 4.6.1.4.d.1 and initiated corrective actions via notification 20021714. The inspectors discussed the event with operators and reviewed operations' actions to improve log package verification. This violation of TS 4.6.1.4.d.1 was determined to be of very low significance (Green) by the SDP, because the main steam isolation valve sealing system remained operable and the deficiency was promptly discovered. The missed TS surveillance 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 .

OA6 Management Meetings

Exit Meeting Summary

On May 19, 2000, the inspectors presented their overall findings to members of PSEG management led by Mr. Dave Garchow. PSEG management acknowledged the findings presented and did not contest any of the inspectors' conclusions. Additionally, they stated that none of the information reviewed by the inspectors was considered proprietary.

During this inspection, one non-cited violation was identified as discussed in the report. If PSEG contests this NCV, a response should be provided within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at the Hope Creek facility.

### ITEMS OPENED AND CLOSED

#### Opened/Closed

05000354/2000-003-001	NCV	Inadequate high radiation area barricade. (Section 2OS1)
05000354/2000-002-00	LER	Failure to meet technical specification surveillance requirement to perform channel check of main steam isolation valve sealing system instrumentation. (Section 4OA5)

### LIST OF ACRONYMS USED

ALARA	As Low As is Reasonably Achievable
ASME	American Society of Mechanical Engineers
EDG	Emergency Diesel Generator
ISI	Inservice Inspection
IVVI	In-vessel Visual Inspection
LER	Licensee Event Report
NDE	Non-destructive Evaluation
NRC	Nuclear Regulatory Commission
PERR	Public Electronic Reading Room
PSEG	Public Service Electric and Gas
RCA	Radiologically Controlled Area
RFO9	Refuel Outage No. 9
RPV	Reactor Pressure Vessel
SW	Service Water
TLD	Thermoluminescent Dosimetry
TS	Technical Specification
UT	Ultrasonic Test

## ATTACHMENT 1

### NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

#### Reactor Safety

- Initiating Events
- Mitigating Systems
- Barrier Integrity
- Emergency Preparedness

#### Radiation Safety

- Occupational
- Public

#### Safeguards

- Physical Protection

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.



The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: <http://www.nrc.gov/NRR/OVERSIGHT/index.html>.