

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

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

Report No. 50-354/99-03

Licensee: Public Service Electric and Gas Company

Facility: Hope Creek Nuclear Generating Station

Location: P.O. Box 236  
Hancocks Bridge, New Jersey 08038

Dates: April 19, 1999 - May 29, 1999

Inspectors: J. D. Orr, Resident Inspector  
L. A. Peluso, Radiation Physicist  
P. R. Frechette, Jr., Physical Security Specialist  
S. M. Pindale, Reactor Engineer  
K. Young, Reactor Engineer  
L. M. Harrison, Reactor Engineer  
R. B. Ennis, Project Manager, Nuclear Reactor Regulation

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

## EXECUTIVE SUMMARY

Hope Creek Generating Station  
NRC Inspection Report 50-354/99-03

This integrated inspection included aspects of operations, engineering, maintenance, and plant support. The report covers a six-week period of resident inspection; in addition, it includes the results of announced inspections by regional inspectors regarding physical security, Year 2000 computer readiness, and miscellaneous open item closures.

### Operations

- Operators did not thoroughly understand electrical schematics for a radiation monitoring system power supply tagout, and this misunderstanding caused an inadvertent actuation of the B channel primary containment isolation system (PCIS). The operators responded appropriately to the unexpected PCIS actuation, and appropriate corrective actions were planned to preclude similar tagout development errors. (Section O4.1)

### Maintenance

- NRC inspectors identified that Hope Creek had not established sufficient filtration, recirculation, and ventilation system (FRVS) differential pressure (d/p) controller setpoints consistent with technical specification requirements. PSE&G engineers completed a design change for adequate controller setpoints. This problem was a violation of NRC requirements and is being treated as a Non-Cited Violation consistent with Section VII.B.1. of the NRC Enforcement Policy. (Section M2.1)
- PSE&G engineers identified and resolved a design deficiency on the accumulator check valves of the reactor building-to-torus vacuum breaker (RBTVB) assemblies. The engineers determined that an improper check valve selection (originally made during initial plant design) could have allowed excessive leakage to occur on the RBTVB accumulators, and implemented a design change for correct check valve replacements. This LER is closed. (Section M8.1)
- PSE&G adequately implemented corrective actions for a backwards installed reactor water cleanup system isolation logic flow element. (Section M8.2)

### Engineering

- PSE&G discovered design inadequacies related to HPCI and RCIC pump suction swapover setpoints, while addressing NRC Information Notice 98-40: *Design Deficiencies Can Leak to Reduced ECCS Pump NPSH During Design-basis Accidents* dated October 26, 1998. PSE&G operators and engineers initiated appropriate corrective actions to restore the HPCI and RCIC systems to full operability. (Section E2.1)

- PSE&G design engineers demonstrated excellent insight by identifying that the Updated Final Safety Analysis Review control rod drop accident analysis was incorrect and non-conservative for offsite dose consequences. PSE&G calculated correct offsite dose consequences, but incorrectly concluded that an unreviewed safety question did not exist when dose consequences increased, yet remained within the original licensing basis guidelines. PSE&G initiated corrective actions to address this unreviewed safety question. (Section E4.1)

#### Plant Support

- PSE&G determined that the auxiliary boiler system had become slightly radioactively contaminated due to weak control of contaminated hoses. PSE&G determined that no unmonitored radioactive release had occurred and the potential dose consequences were negligible. PSE&G thoroughly reviewed this problem, implemented prompt and effective immediate corrective actions, and planned acceptable actions to prevent recurrence. (Section R1.1)
- Overall, the inspectors reviewed security activities, equipment, procedures, and records, and concluded that the security program performance was acceptable and met regulatory requirements and Security Plan commitments. (Section S7)
- PSE&G maintained security facilities and equipment in a reliable condition. Related commitments and NRC requirements were satisfied. (Section S2)
- PSE&G properly implemented security and safeguards procedures. Event logs were properly maintained and effectively used to analyze, track, and resolve safeguards events. (Section S3)
- The security force members adequately demonstrated that they had the requisite knowledge necessary to effectively implement the duties and responsibilities associated with their position. (Section S4)
- PSE&G trained security force personnel in accordance with the requirements of the Training and Qualification Plan. Reviewed training documentation was properly maintained and accurate. (Section S5)
- Management support was adequate to enable effective implementation of the security program, and was evidenced by the allocation of resources to support programmatic needs. (Section S6)
- PSE&G's security audit program was comprehensive in scope and depth. Findings were reported to the appropriate level of management, and the program was properly administered. In addition, a review of the documentation applicable to the self-assessment program indicated that the program was effectively implemented to identify and resolve potential weaknesses. (Section S7)

## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	ii
TABLE OF CONTENTS .....	iv
I. Operations .....	1
O4 Operator Knowledge and Performance .....	1
O4.1 Unexpected PCIS Channel Actuation .....	1
O8 Miscellaneous Operations Issue .....	2
O8.1 (Open/Closed) Licensee Event Report (LER) 50-354/98-008-01 .....	2
II. Maintenance .....	2
M2 Maintenance and Material Condition of Facilities and Equipment .....	2
M2.1 (Open/Closed) LER 50-354/99-005 .....	2
M8 Miscellaneous Maintenance Issues .....	4
M8.1 (Open/Closed) LER 50-354/99-004 .....	4
M8.2 (Closed) Violation 50-354/97-10-03 .....	5
M8.3 (Closed) Violation 50-354/98-10-01 .....	5
III. Engineering .....	6
E2 Engineering Support of Facilities and Equipment .....	6
E2.1 HPCI/RCIC Condensate Storage Tank Low Level Swapover Setpoint ..	6
E4 Engineering Staff Knowledge and Performance .....	7
E4.1 Control Rod Drop Accident 10CFR50.59 Safety Evaluation .....	7
E8 Miscellaneous Engineering Issues .....	8
E8.1 Review of Year 2000 Program and Implementation .....	8
E8.2 (Closed) Violation 50-354/98-07-02 .....	9
E8.3 (Closed) Violation 50-354/98-80-02 .....	9
IV. Plant Support .....	9
R1 Radiological Protection and Chemistry (RP&C) Controls .....	9
R1.1 Auxiliary Boiler System Contamination .....	9
R8 Miscellaneous RP&C Issues .....	11
R8.1 (Closed) Violation 50-354/98-06-01 .....	11
R8.2 (Closed) Inspector Followup Item 50-354-98-06-02 .....	11
S1 Conduct of Security and Safeguards Activities .....	11
S2 Status of Security Facilities and Equipment .....	12
S3 Security and Safeguards Procedures and Documentation .....	13
S4 Security and Safeguards Staff Knowledge and Performance .....	14
S5 Security and Safeguards Staff Training and Qualification .....	14
S6 Security Organization and Administration .....	15
S7 Quality Assurance in Security and Safeguards Activities .....	15
V. Management Meetings .....	16
X1 Exit Meeting Summary .....	16

INSPECTION PROCEDURES USED .....	17
ITEMS OPENED AND CLCSED .....	18
LIST OF ACRONYMS USED .....	19

## Report Details

### Summary of Plant Status

Hope Creek was operated at or near full power for the duration of the inspection period.

### I. Operations

#### **O4 Operator Knowledge and Performance**

##### **O4.1 Unexpected PCIS Channel Actuation**

###### **a. Inspection Scope (71707)**

The inspectors interviewed operators and performed record reviews following an unexpected B channel primary containment isolation system (PCIS) actuation during a tagout evolution.

###### **b. Observations and Findings**

On May 18, 1999, operators prepared a tagout to isolate the B channel radiation monitoring system (RMS) power supply. The power supply was earlier identified during routine testing as requiring replacement. The operators reviewed electric print and logic diagrams to identify the isolation points and expected plant response. The operators concluded that only the B channel reactor building and refuel floor exhaust radiation monitors would trip. Neither radiation monitoring channel tripping by itself would cause an engineered safety feature (ESF) actuation. When the tagout was hung, a B channel PCIS (ESF) actuation occurred. The reactor building and refuel floor exhaust radiation monitors are non-PCIS, but provide an input to the PCIS.

The operators stopped the tagging evolution and assessed the plant response. The isolations and actuations occurred as designed for the B channel PCIS. The isolations and actuations had no effect on continued plant operation. Based on record reviews and interviews, the inspectors judged that the operator response to the B channel PCIS actuation was appropriate. The operators made a timely four hour notification to the NRC operations center in accordance with 10CFR50.72.

The inspectors discussed the tagging problems with the operations manager. The operations manager believed that the operators preparing the tagout had performed the required reviews, but lacked the technical expertise to fully understand the complicated prints for the associated radiation monitoring system. The operations manager indicated that lessons could be learned from the tagging problems and Action Request (AR) 990518141 was initiated to preclude those problems from recurring. The inspectors considered the followup corrective actions to be appropriate.

c. Conclusions

Operators did not thoroughly understand electrical schematics for a radiation monitoring system power supply tagout, and this misunderstanding caused an inadvertent actuation of the B channel primary containment isolation system (PCIS). The operators responded appropriately to the unexpected PCIS actuation, and appropriate corrective actions were planned to preclude similar tagout development errors.

**O8 Miscellaneous Operations Issue**

O8.1 (Open/Closed) Licensee Event Report (LER) 50-354/98-008-01: Automatic Reactor Scram Caused by High Moisture Separator Level

This LER supplements the original LER describing an automatic turbine trip and reactor scram that occurred on November 15, 1998. The supplement provides additional details on completed corrective actions and equipment problem root causes that were identified in refuel outage eight. Details of the scram event were described in NRC Inspection Report 50-354/98-11. Details of the original LER followup were described in NRC Inspection Report 50-354/98-12. The inspectors performed an in-office review of the LER supplement and determined that the additional information was consistent with the conclusions of the original review. This LER supplement is closed.

**II. Maintenance**

**M2 Maintenance and Material Condition of Facilities and Equipment**

M2.1 (Open/Closed) LER 50-354/99-005: Inadequate Secondary Containment Surveillance Tests

a. Inspection Scope (37551, 92700)

The inspectors performed an onsite inspection and verified PSE&G's corrective actions for inadequate settings of the reactor building differential pressure controllers.

b. Observations and Findings

On November 11, 1998, NRC inspectors reviewed the basis for the filtration, recirculation, and ventilation system (FRVS) reactor building differential pressure (d/p) controllers. The FRVS d/p controllers establish the required negative pressure in the reactor building during accident conditions. A negative d/p is necessary to ensure that fission product releases during an accident are treated and released at the design elevated point. The d/p controller establishes reactor building d/p based on a single elevation. The reactor building d/p varies from top to bottom of the building and is also dependent on humidity and temperature conditions inside and outside the building. The NRC inspectors considered that the d/p controller setpoint should be conservatively established to account for the worst case environmental conditions inside and outside

the reactor building. Details of this generic consideration were also described in NRC Information Notice 88-76 dated September 19, 1988.

PSE&G initiated Action Request AR 981117108 to address the NRC questions. On March 24, 1999, PSE&G engineers determined that the reactor building d/p controller setpoints were not conservatively set to maintain 0.25" w.g. vacuum above elevation 200' at all times. (Hope Creek ground elevation is 102' and the top of the reactor building is about elevation 300'). 0.25" w.g. vacuum or better achieved by operating the FRVS system, is required by technical specification surveillance requirements 4.6.5.1.c.1&2. Operators immediately declared the secondary containment inoperable and administratively ensured that plant conditions would remain as allowed by technical specifications. At the time, the plant was already in an allowed condition; refuel outage eight was in progress and activities requiring secondary containment were not occurring.

Design engineers performed a calculation and prepared a design change package to conservatively establish the reactor building d/p controller setpoints for all atmospheric conditions. On March 28, 1999, PSE&G completed the setpoint changes and associated technical specification surveillance tests. The inspectors reviewed the setpoint calculations and verified that the reactor building d/p controllers were properly set. The inspectors judged that the long-lasting problem did not have any safety significance. The elevations of concern, above 200 feet did not contain any building penetrations. The highest penetration in the building was at 174 feet. The Hope Creek reactor building is also a concrete shield building with a welded steel liner. No credible leak paths existed in areas where building d/p could have been less than 0.25" w.g. vacuum. The inspectors determined that PSE&G completed all appropriate corrective actions for this long lasting problem. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in PSE&G's corrective action program as AR981117108 and AR990324220. **(NCV 50-354/99-03-01)**

c. Conclusions

NRC inspectors identified that Hope Creek had not established sufficient filtration, recirculation, and ventilation system (FRVS) differential pressure (d/p) controller setpoints consistent with technical specification requirements. PSE&G engineers completed a design change for adequate controller setpoints. This problem was a violation of NRC requirements and is being treated as a Non-Cited Violation consistent with Section VII.B.1. of the NRC Enforcement Policy.



**M8 Miscellaneous Maintenance Issues****M8.1** (Open/Closed) LER 50-354/99-004: Check Valves for Containment Atmosphere Control System Vacuum Breaker Isolation Valve Accumulator Did Not Meet the Leakage Requirements During Testing**a.** Inspection Scope (92700)

The inspectors reviewed the circumstances surrounding, and corrective actions following inservice testing failures on check valves associated with the reactor building-to-torus vacuum breakers (RBTVB) gas accumulators. The inspection was performed onsite.

**b.** Observations and FindingsBackground

The two reactor building-to-torus drywell vacuum breaker assemblies are designed to prevent the torus air space from becoming subatmospheric during a loss of coolant accident inside primary containment. Each assembly includes an air operated isolation valve. To maintain this valve operable for two hours after a loss of offsite power, there is an accumulator with two check valves.

PSE&G performed leak rate testing for the first time in refuel outage seven (see NRC Inspection Report 50-354/97-10 for details) on the accumulator check valves to verify that the operability of the RBTVB was maintained. During refuel outage eight, the same three check valves that failed leak testing in refuel outage seven, failed again. PSE&G engineers contacted the valve vendor and determined that the valve application was not appropriate. The three failed valves were replaced with a soft seat design enabling the valves to pass the testing. The inspectors verified that PSE&G initiated a corrective action item to replace the fourth check valve with the soft seat design in refuel outage nine.

The inspectors agreed with PSE&G's assessment described in the LER that the safety implications were minimal. The inspectors considered that one RBTVB would likely have operated as designed. The remaining redundant RBTVB would have been available to operate by procedure with the backup primary containment instrument gas (PCIG) system. The inspectors concluded that PSE&G considered a design deficiency and completed corrective actions to preclude the problem from recurring.

**c.** Conclusions

PSE&G engineers identified and resolved a design deficiency on the accumulator check valves of the reactor building-to-torus vacuum breaker (RBTVB) assemblies. The engineers determined that an improper check valve selection (originally made during initial plant design) could have allowed excessive leakage to occur on the RBTVB accumulators, and implemented a design change for correct check valve replacements. This LER is closed.

M8.2 (Closed) Violation 50-354/97-10-03: Reactor Water Cleanup System Flow Element Installed Backwards

a. Inspection Scope (92902)

The inspectors performed an onsite inspection and reviewed PSE&G's corrective actions for a backwards installed reactor water cleanup (RWCU) system flow element. The inspectors also reviewed engineering calculations that supported leaving the element installed in a backwards orientation. The flow element provides an input to the RWCU system isolation actuation logic.

b. Observations and Findings

During a previous NRC inspection, the inspectors reviewed a problem where PSE&G had determined that an orifice plate flow element (FE-N040) in the outlet of the RWCU system had been installed backwards during system piping flange leak repairs. The flow element provided an input to the isolation actuation logic for the RWCU system. The RWCU system is designed to isolate from the reactor coolant system if a leak is sensed in the RWCU system. The isolation logic used flow elements at the inlet and outlet of the RWCU system to compare system flows and provide isolation actuation if a significant flow differential exists. Technical specification 3.3.2 established the differential flow setpoint. PSE&G established new scaling factors for the flow orifice installed in the backwards direction. New calibration data was developed and was incorporated into calibration procedures.

The inspectors reviewed PSE&G's corrective actions for the mis-oriented RWCU flow orifice and determined the corrective actions to be comprehensive and appropriate. The inspectors also reviewed design calculations and a safety evaluation. The inspectors concluded that PSE&G correctly adjusted the calibration data for the RWCU outlet flow element and its setpoint was consistent with technical specification requirements. This violation is closed.

c. Conclusions

PSE&G adequately implemented corrective actions for a backwards installed reactor water cleanup system isolation logic flow element.

M8.3 (Closed) Violation 50-354/98-10-01: Improper Single Cell Charging of Safety-Related Battery & (Closed) Violation 50-354/98-08-02: Inadequate Corrective Action for Steam Leak in Torus Room

The Severity Level IV violations listed above were issued in Notice of Violations prior to the March 11, 1999, implementation of the NRC's new policy for treatment of Severity Level IV violations (Appendix C of the Enforcement Policy). The issues are being closed out in this report, because these violations would be treated as Non-Cited Violations in accordance with Appendix C, PSE&G incorporated these issues in the formal corrective

action system (Action Requests 981001334 and 980902231, respectively), and these issues have minimal risk significance.

### III. Engineering

#### **E2 Engineering Support of Facilities and Equipment**

##### **E2.1 HPCI/RCIC Condensate Storage Tank Low Level Swapover Setpoint**

###### **a. Inspection Scope (37551, 71707)**

The inspectors reviewed PSE&G's resolution of a self-identified non-conservative setpoint for the suction swapover on the high pressure coolant injection (HPCI) and reactor core isolation cooling (RCIC) systems.

###### **b. Observations and Findings**

###### Background

The HPCI and RCIC system suctions are normally aligned to the condensate storage tank (CST). The alternate water source for the HPCI and RCIC systems is the torus. On a low CST level or a high torus water level, the suction path is isolated from the CST and automatically aligned to the torus. The level setpoints at which this occurs is controlled by technical specifications 3.3.2 and 3.3.5. The setpoint for CST isolation is established at a sufficient value before adequate net positive suction head (NPSH) is lost to the HPCI or RCIC pumps. NRC Information Notice 98-40: *Design Deficiencies Can Lead to Reduced ECCS Pump NPSH During Design-basis Accidents* dated October 26, 1998 was issued to alert facilities of potential generic design deficiencies. FSE&G reviewed NRC Information Notice 98-40 and determined that the original design of the HPCI and RCIC pump performance did not consider vortexing in the CST.

###### Problem

PSE&G engineers discovered that the original design of the HPCI and RCIC pumps did not consider vortexing in the CST and that instrument inaccuracies were not properly accounted for in the derived setpoints. The engineers determined that the technical specification setpoints and plant established values for the level swapover instruments were not sufficient to ensure adequate NPSH during design accidents. Operators declared the HPCI and RCIC CST low level swapover instruments inoperable on April 23, 1999. The inspectors verified that the HPCI/RCIC suction paths were realigned to the torus and the CST low level instruments placed in a tripped condition in accordance with technical specifications.

###### Resolution

Operators completed an operability determination (OD) for the HPCI and RCIC systems and engineers supported the OD with a follow-up assessment. The OD concluded that

the HPCI and RCIC systems were operable but in a degraded condition. Adequate compensatory actions were developed to ensure that the HPCI and RCIC systems would remain functional for all modes of use, i.e. reactor pressure vessel control during emergency operating procedure applications. PSE&G initiated a corrective action item, 990423133, to develop and implement adequate CST low level setpoints. PSE&G intended to submit a technical specification amendment to the NRC for approval after the setpoints were determined. The inspectors considered PSE&G's actions to date and proposed long term corrective actions to be timely and conservative.

c. Conclusions

PSE&G discovered design inadequacies related to HPCI and RCIC pump suction swapper setpoints, while addressing NRC Information Notice 98-40: *Design Deficiencies Can Leak to Reduced ECCS Pump NPSH During Design-basis Accidents* dated October 26, 1998. PSE&G operators and engineers initiated appropriate corrective actions to restore the HPCI and RCIC systems to full operability.

**E4 Engineering Staff Knowledge and Performance**

E4.1 Control Rod Drop Accident 10CFR50.59 Safety Evaluation

a. Inspection Scope (37551)

The inspectors reviewed the resolution of a PSE&G-identified discrepancy between the Updated Final Safety Analysis Report (UFSAR) license basis and operation of the mechanical vacuum pumps during plant startup as related to control rod drop analyses.

b. Observations and Findings

PSE&G intended to revise the condenser air removal system operating procedure to incorporate changes for a new method of warming the main turbine low pressure rotor during the upcoming plant startup (after refuel outage eight). Design engineers reviewed the submitted procedure change and associated 10CFR50.59 safety evaluation. During the review, the design engineers discovered that the original UFSAR control rod drop accident analysis was not consistent with actual plant operation.

UFSAR section 15.4.9.5. described the radiological consequences of a control rod drop accident. The analysis assumed that the offgas system would mitigate the fission product release during the rod drop accident. The design engineers recognized that during a control rod drop accident during plant startup, the mechanical vacuum pumps are operating and bypassing the offgas treatment system. The mechanical vacuum pumps are physically restrained to discharge directly and untreated to the south plant ventilation stack.

PSE&G performed an analysis to determine the offsite dose consequences associated with the control rod drop accident coincident with the mechanical vacuum pumps operating. The results at the site area boundary were:

	Thyroid (rem)	Whole Body (rem)
Safety Evaluation Report	<1	<1
New Analysis	19.53	1.76
Standard Review Plan Acceptance Criteria	75	6
10CFR100 Requirements	300	25

PSE&G used the original calculation methodology and determined that the new offsite dose consequences were acceptable within Standard Review Plan (SRP) 15.4.9 Appendix A guidelines. PSE&G concluded that the radiological consequences for the accident increased, but did not believe that the change involved an unreviewed safety question. PSE&G considered that the radiological consequences were within the original SRP acceptance criteria and as such would not require NRC approval. The inspectors disagreed because the analyzed radiological consequences had increased, and as such, required NRC approval by 10CFR50.59(a)(1)&(2). PSE&G initiated a corrective action item to submit a license amendment for the unreviewed safety question. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in PSE&G's corrective action program as AR990602192. (NCV 50-354/99-03-02)

c. Conclusions

PSE&G design engineers demonstrated excellent insight by identifying that the Updated Final Safety Analysis Review control rod drop accident analysis was incorrect and non-conservative for offsite dose consequences. PSE&G calculated correct offsite dose consequences, but incorrectly concluded that an unreviewed safety question did not exist when dose consequences increased, yet remained within the original licensing basis guidelines. PSE&G initiated corrective actions to address this unreviewed safety question.

**E8 Miscellaneous Engineering Issues**

**E8.1 Review of Year 2000 Program and Implementation**

An NRC review was conducted of Hope Creek Year 2000 (Y2K) activities using NRC Temporary Instruction (TI) 2515/141, "Review of Year 2000 (Y2K) Readiness of Computer Systems at Nuclear Power Plants." The review included aspects of PSE&G's Y2K management planning, assessment, documentation, and remediation activities. PSE&G's Y2K testing and validation, notification activities, and contingency plans were also reviewed. NEI/NUSMG 97-07, "Nuclear Utility Year 2000 Readiness," and NEI/NUSMG 98-07, "Nuclear Utility Year 2000 Readiness Contingency Planning," were used as the primary references for this review. The detailed results of this review will be

combined with similar reviews of Y2K programs at other U.S. commercial nuclear power plants and summarized in a report to be issued by the NRC staff by July 31, 1999.

**E8.2** (Closed) Violation 50-354/98-07-02: Inadequate Corrective Actions for Main Steam Isolation Valve Operation and Testing

The Severity Level IV violation listed above was issued in a Notice of Violation prior to the March 11, 1999, implementation of the NRC's new policy for treatment of Severity Level IV violations (Appendix C of the Enforcement Policy). This violation is being closed out in this report, because this violation would be treated as a Non-Cited Violation in accordance with Appendix C, PSE&G incorporated this issue in the formal corrective action system (Action Requests 980804142 and 980810241), and the issue has minimal risk significance.

**E8.3** (Closed) Violation 50-354/98-80-02: Five Examples of Inadequate Corrective Actions

The Severity Level IV violation listed above was issued in a Notice of Violation prior to the March 11, 1999, implementation of the NRC's new policy for treatment of Severity Level IV violations (Appendix C of the Enforcement Policy). This violation is being closed out in this report, because it would be treated as a Non-Cited Violation in accordance with Appendix C, PSE&G incorporated this issue in the formal corrective action system (Action Requests 980311265, 980615182, 980316166, and 980615189), and the issue has minimal risk significance..

#### **IV. Plant Support**

**R1 Radiological Protection and Chemistry (RP&C) Controls**

**R1.1** Auxiliary Boiler System Contamination

a. Inspection Scope (71707, 71750)

The inspectors reviewed PSE&G's actions after they identified low levels of radioactive contamination in two of the three auxiliary boilers, including meeting with the responsible PSE&G personnel.

b. Observations and Findings

On April 5, 1999, chemistry technicians identified low radioactive contamination levels in the B auxiliary boiler. Subsequent analyses identified similar activity in the A auxiliary boiler and the common auxiliary boiler de-aerator. The remaining auxiliary boiler C was not contaminated. The inspectors reviewed PSE&G's immediate and follow-up activities and found the activities to be thorough. PSE&G confirmed that no releases occurred that would have inadvertently discharged any of this low activity to the environment. The approximate activity levels were between 1E-07 and 1E-09  $\mu\text{Ci/ml}$  of Mn-54.

After the low activity levels were identified, PSE&G initiated several immediate corrective actions and developed a plan to determine the cause of the contamination, determine the extent of condition, and flush and decontaminate the contaminated systems. The immediate actions included isolating the affected equipment. The plan included sampling several other systems, which identified some localized demineralized water system taps that were slightly contaminated. Subsequently, PSE&G drained the contents of the contaminated components and processed the liquid as radioactive waste. All equipment was flushed, sampled and PSE&G intended to continue the equipment flushes and eliminate all radioactive contamination.

PSE&G engaged the corrective action system to identify, document, evaluate and correct the low level radioactive contamination issues for the auxiliary boilers and the demineralized water system in Action Requests, AR 990406077 and AR 990411097. PSE&G conducted an extensive investigation and concluded that the most likely cause for contaminating the normally non-contaminated systems was inappropriate use of temporary hoses. Specifically, hoses that contained low levels of radioactive contamination on the internal surfaces were likely used during maintenance activities during the recent refueling outage. The inspectors agreed with this diagnosis.

The inspectors reviewed PSE&G's evaluation associated with NRC Information Notice 80-10, *Contamination of Nonradioactive System and Resulting Potential for Unmonitored, Uncontrolled Release of Radioactivity to Environment*. PSE&G properly identified the auxiliary boiler system as a system that could potentially become contaminated. Also, they identified that the condensate transfer system, a slightly contaminated system, may contaminate other plant systems. Station procedure NC.NA-AP.ZZ-0024(Q), *Radiation Protection Program*, emphasized the need to minimize cross-connecting clean and contaminated systems. Chemistry procedure HC.CH-TI.ZZ-0012(Q), *Chemistry Sampling Frequencies, Specifications, and Surveillances*, also required periodic sampling of the auxiliary boiler and demineralized water systems to detect the presence of radioactive contamination. In fact, this periodic sampling (weekly, for in-service boilers) identified the radioactive contamination.

PSE&G determined that the hose control program was weak and contributed to this problem. Accordingly, PSE&G planned to enhance the hose control program and its implementation as a measure to prevent future recurrence. The inspectors considered PSE&G's corrective actions to be appropriate.

c. Conclusions

PSE&G determined that the auxiliary boiler system had become slightly radioactively contaminated due to weak control of contaminated hoses. PSE&G determined that no unmonitored radioactive release had occurred and the potential dose consequences were negligible. PSE&G thoroughly reviewed this problem, implemented prompt and effective immediate corrective actions, and planned acceptable actions to prevent recurrence.

**R8 Miscellaneous RP&C Issues****R8.1 (Closed) Violation 50-354/98-06-01: Failure to Establish Environmental Sampling Procedures to Collect Drinking Water, Fish and Invertebrate Samples**

The inspectors conducted an in-office review of PSE&G's violation response, as indicated in their letter dated August 3, 1998, using inspection procedure 84750. On June 9, 1998, the inspectors determined that PSE&G had not established written vendor procedures for sampling potable (drinking) water and that the procedure for aquatic media (fish and invertebrates) lacked sample collection guidance. In response, PSE&G implemented corrective actions that included establishment of a vendor procedure for sampling potable water, and a revision to the existing vendor's procedure for sampling fish and invertebrates. These procedures contained a description of sample collection methodology in sufficient detail without being prescriptive. PSE&G incorporated standard collection methodologies from the American Society for Testing and Materials (ASTM) for each sample type into the procedures. The inspectors determined these corrective actions to be acceptable. This item is closed.

**R8.2 (Closed) Inspector Followup Item 50-354-98-06-02: Channel Functional Test for Meteorological Sensors**

The inspector opened this item to track PSE&G's evaluation of their calibration procedure for wind speed sensors to determine the appropriateness of including a channel functional test. PSE&G revised the procedure to include a channel function test as part of the periodic channel calibration. The functional test included spinning the wind speed transmitter at a known rotation rate and verifying the channel output display. The procedure revision also included a specific definition of a channel calibration and a channel functional test. Although no prescriptive requirement existed regarding channel functional test methodology, information is documented in the American Society for Testing and Materials (ASTM) Code. Based on PSE&G's amendment to the channel calibration methodology to include a channel functional test for meteorological sensors, this item is closed.

**S1 Conduct of Security and Safeguards Activities****a. Inspection Scope (81700)**

From April 19-22, 1999, the inspectors assessed whether the security and safeguards activities met PSE&G's commitments in the NRC-approved security plan (the plan) and NRC regulatory requirements. Areas inspected included: alarm stations; communications; and protected area (PA) access control of personnel and packages.

**b. Observations and Findings**

Alarm Stations. The inspectors reviewed Central Alarm Station (CAS) and Secondary Alarm Station (SAS) operations. Both alarm stations were equipped with appropriate alarm, surveillance and communication capabilities. Alarm station operators were



knowledgeable of their duties and responsibilities. Observations and interviews also verified that the alarm stations were continuously manned, independent and diverse, so that no single act could remove the plant's capability for detecting a threat and calling for assistance. The inspectors did not identify any operational activities in the alarm stations that could interfere with the execution of the detection, assessment and response functions.

Communications. The inspectors verified that the alarm stations were capable of maintaining continuous intercommunications and communications with each security force member (SFM) on duty. Alarm station operators tested communication capabilities with the local law enforcement agencies as committed to in the plan.

Protected Area (PA) Access Control of Personnel and Hand-Carried Packages. On April 20 and 21, 1999, during peak activity periods, the inspectors observed personnel and package search activities at the personnel access portal. PSE&G maintained positive controls to ensure that only authorized individuals were granted access to the PA and that all personnel and hand-carried items entering the PA received a proper search.

c. Conclusions

PSE&G performed its security and safeguards activities in a manner that protected public health and safety and met associated commitments and NRC requirements.

**S2 Status of Security Facilities and Equipment**

a. Inspection Scope (81700)

The inspectors reviewed PSE&G's maintenance of PA detection and assessment aids, and personnel search equipment.

b. Observations and Findings

Assessment Aids. On April 20 and 21, 1999, the inspectors evaluated the effectiveness of the assessment aids by observing the PA perimeter on closed circuit television (CCTV) in the CAS and the SAS, respectively. This evaluation was accomplished by observing, on CCTV, an SFM walk the entire site perimeter. The assessment aids generally had good picture quality, view and zone overlap. Some monitor problems associated with an ongoing security computer upgrade were observed, although the ability to make an assessment remained intact. The inspectors anticipated that picture quality would be returned to high quality upon completion of the computer upgrade project. Additionally, to ensure plan commitments were satisfied, PSE&G had procedures in place that specified compensatory measures in the event the alarm station operator was unable to properly assess the cause of an alarm.

PA Detection Aids. The inspectors also observed testing of all intrusion detection zones in the plant PA. The appropriate alarm was generated in each zone for each test. Through observations and review of testing documentation associated with equipment repairs, the inspectors verified that PSE&G conducted repairs in a timely manner and that the equipment was maintained functional in accordance with the plan commitments.

Personnel and Package Search Equipment. On April 19, 1999, the inspectors observed both the routine use and the daily operational testing of PSE&G's personnel and package search equipment. Personnel search equipment was tested and maintained in accordance with PSE&G procedures and the plan, and personnel and packages were properly searched prior to PA access.

The inspectors verified that search equipment performed in accordance with PSE&G procedures and plan commitments.

c. Conclusions

PSE&G maintained security facilities and equipment in a reliable condition. Related commitments and NRC requirements were satisfied.

**S3 Security and Safeguards Procedures and Documentation**

a. Inspection Scope (81700)

The inspectors reviewed security department implementing procedures and security event logs.

b. Observations and Findings

Security and Program Procedures. The inspectors reviewed selected security program implementing procedures associated with personnel search, vehicle search and equipment testing, and verified that the procedures were consistent with the plan commitments.

Security Event Logs. The security event logs for the previous twelve months were reviewed. PSE&G had appropriately analyzed, tracked, resolved and documented safeguards events which did not require a report to the NRC within 1 hour.

c. Conclusions

PSE&G properly implemented security and safeguards procedures. Event logs were properly maintained and effectively used to analyze, track, and resolve safeguards events.

**S4 Security and Safeguards Staff Knowledge and Performance**a. Inspection Scope (81700)

The inspectors assessed the level of requisite knowledge of PSE&G's security staff.

b. Observations and Findings

Security Force Member (SFM) Requisite Knowledge. The inspectors observed a number of SFMs during the performance of their routine duties. These observations included alarm station operations, personnel and package searches, and exterior patrol alarm response. Additionally, the inspectors interviewed SFMs and determined that they were knowledgeable of their responsibilities and duties, and could effectively carry out their assignments.

c. Conclusions

The security force members adequately demonstrated that they had the requisite knowledge necessary to effectively implement the duties and responsibilities associated with their position.

**S5 Security and Safeguards Staff Training and Qualification**a. Inspection Scope (81700)

The inspectors reviewed the effectiveness of security training, including training and qualification (T&Q) records.

b. Observations and Findings

Security Training and Qualifications. The inspectors reviewed T&Q records of 10 SFMs, which indicated that these personnel were trained in accordance with the approved T&Q plan. In addition, the inspectors observed a training evolution at the firing range, which included a range operations and safety briefing. The training was conducted in a very professional manner, with a strong emphasis on safety. The range instructor maintained positive control of all activities.

Training Records. Through review of training records, the inspectors determined that training records were properly maintained, accurate and reflected the current qualifications of the SFMs.

c. Conclusions

PSE&G trained security force personnel in accordance with the requirements of the Training and Qualification Plan. Reviewed training documentation was properly maintained and accurate.

**S6 Security Organization and Administration**a. Inspection Scope (81700)

The inspectors assessed a PSE&G management report of security activities and reviewed security department staffing levels.

b. Observations and Findings

Management Support. The inspectors reviewed program implementation since the last program inspection and determined that adequate support and resources continued to be available to ensure effective program implementation.

Staffing Levels. The total number of trained SFMs immediately available on shift met the requirements specified in the plan and implementing procedures.

c. Conclusions

Management support was adequate to enable effective implementation of the security program, and was evidenced by the allocation of resources to support programmatic needs.

**S7 Quality Assurance in Security and Safeguards Activities**a. Inspection Scope (81700)

The inspectors reviewed audits, problem analyses, corrective actions and effectiveness of management controls.

b. Observations and Findings

Audits. Surveillances conducted as part of the 1999 QA security program audit were reviewed. Review of the audit checklists and the surveillances disclosed that the audit included all components of the security program and was comprehensive in scope.

Problem Analyses. A review of data derived from the security department's self-assessment program indicated that potential weaknesses were properly identified, tracked, and trended.

Corrective Actions. A review of PSE&G's corrective actions implemented in response to the QA audits and self-assessment program disclosed that all corrective actions had been implemented and were effective.

Effectiveness of Management Controls. PSE&G established programs to identify, analyze and resolve problems. The programs included the performance of annual QA audits, a departmental self-assessment program and the use of industry data, such as

violations of regulatory requirements identified by the NRC at other facilities, as a criterion for self-assessment.

c. Conclusions

PSE&G's security audit program was comprehensive in scope and depth. Findings were reported to the appropriate level of management, and the program was properly administered. In addition, a review of the documentation applicable to the self-assessment program indicated that the program was effectively implemented to identify and resolve potential weaknesses.

Overall Security Program Conclusions

The inspectors reviewed security activities, equipment, procedures, and records, and concluded that the security program performance was acceptable and met regulatory requirements and Security Plan commitments.

**V. Management Meetings**

**X1 Exit Meeting Summary**

The inspectors presented the preliminary inspection results to plant management led by Lou Storz at the conclusion of the inspection on June 4, 1999. PSE&G acknowledged the findings presented.

The inspectors asked PSE&G whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

**INSPECTION PROCEDURES USED**

IP 37551: Onsite Engineering  
IP 61726: Surveillance Observations  
IP 62707: Maintenance Observations  
IP 71707: Plant Operations  
IP 71750: Plant Support Activities  
IP 81700: Physical Security Program for Power Reactors  
IP 84750: Environmental Monitoring  
IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor  
Facilities  
IP 92901: Followup - Plant Operations  
IP 92902: Followup - Maintenance  
IP 92903: Followup - Engineering  
IP 93702: Prompt Onsite Response to Events at Operating Power Reactors

## ITEMS OPENED AND CLOSED

Opened/Closed

50-354/99-03-01	NCV	Inadequate secondary containment surveillance tests. (Section M2.1)
50-354/99-03-02	NCV	Mechanical vacuum pump operation during control rod drop accident 10CFR50.59 safety evaluation. (Section E4.1)
50-354/98-008-01	LER	Automatic reactor scram caused by high moisture separator level. (Section O8.1)
50-354/99-004	LER	Check valves for containment atmosphere control system vacuum breaker isolation valve accumulator did not meet the leakage requirements during testing. (Section M8.1)
50-354/99-005	LER	Inadequate secondary containment surveillance tests. (Section M2.1)

Closed

50-354/97-10-03	VIO	Reactor water cleanup system flow element installed backwards. (Section M8.2)
50-354/98-06-01	VIO	Failure to establish environmental sampling procedures to collect drinking water, fish, and invertebrate samples. (Section R8.1)
50-354/98-06-02	IFI	Determine the appropriateness of performing a channel functional test for meteorological sensors. (Section R8.2)
50-354/98-08-02	VIO	Inadequate corrective action for steam leak in torus room. (Section M8.3)
50-354/98-10-01	VIO	Improper single cell charging of safety-related battery. (Section M8.3)
50-354/98-07-02	VIO	Inadequate corrective actions for main steam isolation valve operation and testing. (Section E8.2)
50-354/98-80-02	VIO	Five examples of inadequate corrective actions. (Section E8.3)

## LIST OF ACRONYMS USED

ASTM	American Society For Testing and Materials
CAS	Central Alarm System
CCTV	Closed Circuit Television
CST	Condensate Storage Tank
d/p	Differential Pressure
ESF	Engineered Safety Feature
FRVS	Filtration, Recirculation and Ventilation System
HPCI	High Pressure Coolant Injection
LER	Licensee Event Report
NPSH	Net Positive Suction Head
NRC	Nuclear Regulatory Commission
OD	Operability Determination
PA	Protected Area
PCIG	Primary Containment Instrument Gas
PCIS	Primary Containment Isolation System
PDR	Public Document Room
PSE&G	Public Service Electric and Gas
QA	Quality Assurance
RBTVB	Reactor Building to Torus Vacuum Breakers
RBVS	Reactor Building Ventilation System
RCIC	Reactor Core Isolation Cooling
RMS	Radiation Monitoring System
RP&C	Radiological Protection and Chemistry
RWCU	Reactor Water Cleanup
SAS	Secondary Alarm System
SFM	Security Force Member
SRP	Standard Review Plan
T&Q	Training and Qualification
the Plan	NRC-Approved Physical Security Plan
TI	Temporary Instruction
UFSAR	Updated Final Safety Analysis Report
Y2K	Year 2000