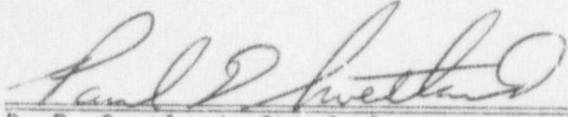


U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 50-354/89-09
License NPF-57
Licensee: Public Service Electric and Gas Company
P. O. Box 236
Hancocks Bridge, New Jersey 08038
Facility: Hope Creek Generating Station
Dates: March 14, 1989 - April 30, 1989
Inspectors: G. W. Meyer, Senior Resident Inspector
D. K. Allsopp, Resident Inspector
N. F. Dudley, Project Engineer
C. G. Miller, Reactor Engineer

Approved:


P. D. Swetland, Chief, Projects Section 2B

5/10/89
Date

Inspection Summary:

Inspection 50-354/89-09 on March 14, 1989 - April 30, 1989

Areas Inspected: Resident safety inspection of the following areas: operations, radiological controls, maintenance & surveillance testing, emergency preparedness, security, engineering/technical support, safety assessment/assurance of quality, and Licensee Event Report and open item followup.

Results: The inspectors did not identify any violations. An Executive Summary follows.

EXECUTIVE SUMMARY

Hope Creek Inspection Report 50-354/89-09

March 13, 1989 - April 30, 1989

Operations: After a sustained observation of control room activities the inspector concluded that the operators worked well as a crew and maintained a professional, questioning approach toward plant evolutions, which contributed to a conservative and safety conscious attitude. The inspectors determined that control room operators' actions and responses during an inadvertent channel C LOCA actuation and following a failed shut main turbine control valve were timely and effective. The inspector concluded that PSE&G actions in response to an incident involving an inattentive shift supervisor were proper.

Radiological Control: Radiological personnel identified and locked a normally locked high radiation door, which had inadvertently been left unlocked for nearly 24 hours. Additional supervisory attention may be needed in the internal communication area of Radiological Protection to prevent future problems. Temporary reduction of reactor power for ALARA considerations during a valve repair was commendable.

Maintenance/Surveillance: The inspector found an instance where test equipment beyond its calibration due date that was about to be used. The inspector concluded that the 26 surveillance tests performed up to 10 days beyond the required 687 day interval represented a noncited violation. Events involving the loss of shutdown cooling during a test and the loss of both CREF units due to unrelated equipment problems were reviewed and found to be acceptable. The inspector identified a poor testing technique during a surveillance test and a misplaced work order. An Unresolved Item regarding control of scaffolding was closed.

Emergency Preparedness: The inspector observed Emergency Drill H89-01 and concluded the drill effectively exercised the C team of emergency response personnel.

Security: Routine inspection did not identify any noteworthy findings. PSE&G committed to address the findings of the Regulatory Effectiveness Review (RER) performed April 10-14.

Engineering/Technical Support: The inspector reviewed PSE&G evaluations of Rosemount transmitter problems, monitoring of system performance by system engineering, and composite drawings of motor operated valve power supply and controls.

Safety Assessment/Assurance of Quality: The inspector noted that the three minor personnel errors found by the inspector represented a adverse short term trend. The inspector noted commendable efforts regarding engineering review of Rosemount transmitters and monitoring of system performance by system engineering.

DETAILS

1. SUMMARY OF OPERATIONS

The unit entered this inspection period (March 13 - April 30) at full power and continued power operations throughout the period. On April 14 an equipment operator's error resulted in an intermediate recirculation pump runback and a C channel Loss of Coolant Accident (LOCA) signal including operation of its actuation equipment.

2. OPERATIONS (71707, 71710, 71715, 93702)

2.1 Inspection Activities

The inspectors verified that the facility was operated safely and in conformance with regulatory requirements. Public Service Electric and Gas (PSE&G) Company management control was evaluated by direct observation of activities, tours of the facility, interviews and discussions with personnel, independent verification of safety system status and Limiting Conditions for Operation, and review of facility records. These inspection activities were conducted in accordance with NRC inspection procedures 71707, 71710, 71715 and 93702. The inspectors performed 245 hours of normal and backshift inspection, including weekend inspection on March 25.

2.2 Inspection Findings and Significant Plant Events

- A. On April 14, an actuation of LOCA channel C occurred during the return to service of emergency core cooling system (ECCS) channel C transmitters. The problem began at 8:06 a.m. when an equipment operator mistakenly placed a second 125 VDC battery charger in the equalization mode, which resulted in a momentary high voltage condition on 125 VDC bus C. This tripped the instrumentation DC/AC inverter (Topaz) and the associated transmitters on ECCS channel C. Accordingly, this resulted in C core spray, C Residual Heat Removal (RHR), and High Pressure Coolant Injection (HPCI) being inoperable; Hope Creek entered general action statement 3.0.3 at this point.

The equipment operator had quickly recognized his mistake when the two battery chargers tripped. He then returned the two chargers to service and the 125 VDC bus returned to a normal alignment. However, the tripped inverter remained tripped, because its input voltage had not dropped below the reset value. To return the inverter to service, a fuse was removed and reinserted at 8:40 a.m., but an electrical surge in the instrumentation resulted in a C channel LOCA signal actuation. Accordingly, C RHR, C core spray, C diesel generator, HPCI, and C service water initiated and C channel isolations occurred. Prior to any HPCI injection to the vessel, the

operators manually terminated HPCI after confirming normal reactor parameters. Stripping of non-IE Division C electrical loads caused tripping of the C reactor feed pump and a subsequent intermediate runback of the recirculation pumps.

All equipment actuations occurred as designed. The operators returned the affected equipment to service and returned the reactor to full power.

PSE&G evaluated corrective actions, including caution tagging of battery chargers during equalization charges and establishment of an abnormal procedure to cover return to service of a Topaz inverter.

- B. The inspector observed control room operations for a sustained period, including two shift turnovers, and concluded that the control room personnel had performed acceptably and professionally. During the observation, several surveillances were in progress, and maintenance was being conducted on feedwater heaters and the service water system. The operators were observed dealing with an on-the-spot procedural change, entry and exit from Technical Specification (TS) Limiting Conditions for Operation (LCOs), issuing tagouts, and resolving unexpected procedural and equipment problems.

The operators worked as a crew and maintained a professional, questioning approach toward plant evolutions, which contributed to a conservative and safety conscious attitude. The communication between the operators on the crew and between the operators and other personnel were formal and included acknowledgements of directions and information. The command and control of the shift events was structured and disciplined, with the Senior Nuclear Shift Supervisor and Nuclear Shift Supervisor cognizant of ongoing plant evolutions and providing supervisory oversight. The logs maintained by the crew were adequate to reconstruct the events that occurred during the shift. Turnovers were conducted formally and documented in accordance with facility administrative procedures.

- C. In mid-March an incident occurred involving a Nuclear Shift Supervisor (a licensed Senior Reactor Operator) being inattentive to his duties due to grogginess. The Senior Nuclear Shift Supervisor (his supervisor) took action to correct the problem immediately, and when informed, Operations Department management relieved the individual from further shifts pending evaluation and corrective action. Factors involved in the inattentive condition included poor judgement concerning pre-shift activities, over-the-counter drugs with drowsiness side effects, and inability to use caffeine. The individual acknowledged in writing that any other such incident would result in his termination. He returned to duty a week later. On April 6 a memo was issued to Operations personnel and plant supervision describing the incident and the applicable policy.

The inspector reviewed the incident including discussions with all the personnel involved. The inspector concluded that the incident had been handled properly and appropriately. The inspector received an anonymous allegation (No. RI-89-A-0054) on April 13 concerning the incident, which alleged other circumstances regarding this occurrence including involvement of another named senior reactor operator and the security staff. Further, inspector review did not substantiate the alleged circumstances.

- D. On April 26, the operators reduced reactor power when the no. 4 main turbine control valve failed shut. The control valve drifted shut over 1.5 minutes and caused 5 bypass valves to sequentially open to control pressure. The operators reduced recirculation flow to reduce reactor power until all bypass valves were shut. The no. 4 control valve failed shut when a servo-control valve lost power due to a severed lug termination. During the troubleshooting and repair, Operations responded to a Radiological Protection request to further reduce power from 85% to 70% to reduce the workers' dose during the repair.

There are no overhead annunciators which alarm when a bypass valve opens, but there is a computer display of parameters, which did highlight the opened bypass valves. Based on a review of a printout of the computer alarm chronology, the inspector concluded that the operators had responded quickly and accurately to the incident. A design change request was initiated to review installation of an overhead annunciator to alarm when any bypass valve opens.

3. RADIOLOGICAL CONTROLS (71707)

3.1 Inspection Activities

PSE&G's compliance with the radiological protection program was verified on a periodic basis. These inspection activities were conducted in accordance with NRC inspection procedure 71707.

3.2 Inspection Findings and Review of Events

- A. On April 28 Radiological Protection (RP) personnel determined that a high radiation area door, which should have been locked closed, was closed but not locked for 23.5 hours. This high radiation area door controls access to the extraction steam/feedwater heater room and was unlocked when the high radiation controls for the room were removed, i.e., deposted, at 10:00 a.m. on April 27. The room was deposted when radiation levels were reduced after extraction steam was isolated to allow maintenance on the feedwater heaters. When maintenance on the feedwater heaters was completed, Operations informed RP at 8:30 p.m. on April 27 to repost the room because extraction steam was being returned to service. However, due to an internal RP

communication breakdown, the room was not reposted or locked. During daily plant rounds RP personnel identified the unlocked high radiation door at 8:00 p.m. on April 28 and immediately locked it. The radiation levels in this room were low enough that Technical Specifications would not have required this door to be locked. As corrective action, personnel dosimetry was reviewed to confirm that no unusual doses occurred, and a previously initiated revision to the tagging procedure was expedited to specify that the shift RP technician must personally authorize removal of tagouts to the extraction steam system. In addition, the inspector concluded that additional supervisory attention may be needed regarding RP internal communications to prevent future problems.

3. As discussed in Section 2.2.D, the cooperation was commendable between Operations and RP in further reducing reactor power temporarily in order to reduce worker radiation exposure during the valve repair. This action demonstrated a good ALARA (As Low As Reasonably Achievable) approach.

4. MAINTENANCE/SURVEILLANCE TESTING (62703, 61726, 92701)

4.1 Maintenance Inspection Activity

The inspectors observed selected maintenance activities on safety-related equipment to ascertain that these activities were conducted in accordance with approved procedures, Technical Specifications, and appropriate industrial codes and standards. These inspections were conducted in accordance with NRC inspection procedures 62703, 61726 and 92701.

Portions of the following activities were observed by the inspector:

<u>Work Order</u>	<u>Procedure</u>	<u>Description</u>
890427122	MD-GP.ZZ-022	Cleaning of lube oil strainer on B diesel generator
890427061	IC-GP.ZZ-008	Replace C EDG DC control relay
881006100	MD-GP.ZZ-045	Service water strainer backflush valve overhaul and inspection
881216003	MD-PM.EA-001	A service water strainer disassembly and inspection
890501109	MD-PM.EP-001	Inspect and tighten service water traveling screen bolts

The maintenance activities inspected were effective with respect to meeting the safety objectives of the maintenance program.

4.2 Surveillance Testing Inspection Activity

The inspectors performed detailed technical procedure reviews, witnessed in-progress surveillance testing, and reviewed completed surveillance packages. The inspectors verified that the surveillance tests were performed in accordance with Technical Specifications, approved procedures, and NRC regulations. These inspection activities were conducted in accordance with NRC inspection procedure 61726.

The following surveillance tests were reviewed, with portions witnessed by the inspector:

- OP-IS.BD-001 Inservice test of RCIC
- IC-FT.SP-054 Functional test of main steam line radiation monitor
- IC-FT.BB-010 Functional test of drywell pressure channel B
- IC-CC.HA-001 Channel calibration of waste gas hydrogen monitor

The surveillance testing activities inspected were effective with respect to meeting the safety objectives of the surveillance testing program.

4.3 Inspection Findings

- A. On April 18, the inspector observed a channel calibration on the hydrogen monitor of the waste gas panel, in which a multimeter with an expired calibration was about to be used. The inspector notified the technicians that the Keithley Model 197 multimeter, which was connected into the back of the cabinet, was not current in its calibration. The technicians had not entered the body of the surveillance procedure, in which the test equipment identification number and calibration expiration date would have been recorded. Although this step would probably have caused the technicians to identify the expired calibration, the inspector was concerned that the test equipment had been issued for field use. Conversations with the Maintenance Engineer - Controls and an I&C Senior Supervisor indicated that some problems exist with the issuing of calibrated measuring and test equipment, as well as station procedure SA-AP.ZZ-022 on control of calibrated equipment. Based on numerous previous surveillance inspections without such incidents, this appeared to be an isolated incident. However, the lack of reliability with the issuing system, combined with the present shop practices create an environment in which future occurrences of this type could occur. The Maintenance Engineer - Controls planned

further investigation and corrective action to ensure compliance with procedure SA-AP.ZZ-022(Q). The inspectors will continue to review this area.

- B. During the previous inspection period, a loss of shutdown cooling occurred for 12 minutes during performance of an I&C surveillance procedure while the reactor was in cold shutdown. The change in reactor coolant temperature during this period was minimal. The Residual Heat Removal (RHR) System was aligned in the shutdown cooling mode and isolated when a recently added section to the surveillance procedure overlooked an electrical lead to lift and isolate. The change had been inserted to prevent the inadvertent isolation of shutdown cooling. The root cause of this occurrence was determined to be non-cognitive personnel errors on the part of the writer and the reviewer of this procedure change. The safety impact from this incident was minimal as reactor temperatures were maintained with the reactor water cleanup system and the low pressure coolant injection system was available for decay heat removal if needed. Corrective action included an immediate procedure correction, a review of other channel RHR procedures, and counseling to all procedure writers and reviewers. (LER 89-05)

The inspector concluded that the difficulty of tracing the applicable electrical leads on numerous drawings contributed to the personnel error described above. This drawing issue is further discussed in Section 7.C.

- C. During the previous inspection period, a scheduling error in the surveillance computer tracking system resulted in 26 surveillance procedures exceeding their Technical Specification (TS) required surveillance interval (R frequency = refueling, 18 months) by one to ten days.

The computer tracking system used an 18 month surveillance frequency of 558 days, calculated from the TS definition of a monthly interval of 31 days ($18 \times 31 = 558$). However, the TS definition of R frequency is "at least once per 18 months (550 days)". When the grace period (25%) is applied, these intervals become 687 and 697 days; this caused surveillance testing to be overdue by as much as ten days (1.5% of the interval). None of the systems tested beyond the correct interval were found to have problems or be inoperable. Corrective action included reviewing the scheduling of all station surveillance procedures; no other problems were found. (LER 89-06)

Although there were surveillance tests outside the required interval, this violation is not being cited because of the minimal safety significance, i.e., the criteria specified in Section V.A of the Enforcement Policy were satisfied. (NCV 89-09-01)

- D. On April 7, both control room emergency filtration (CREF) units were declared inoperable due to unrelated equipment problems and Technical Specification (TS) 3.0.3 was entered for 46 minutes. The A CREF train was declared inoperable at 6:35 p.m. due to a seal failure, which was discharging freon from its associated chiller. The B CREF system chiller was placed in service to maintain system ventilation loads. The B CREF system chiller failed due to a torn damper actuator amplifier diaphragm and TS 3.0.3 was entered at 10:35 p.m. TS 3.0.3 was exited at 11:21 p.m. when the B CREF chiller damper was returned to service.
- E. While observing the functional test of the main steam line radiation monitor, the inspector noted poor testing technique. Specifically, the test procedure specified that the radiation value be decreased until the downscale occurred, with the alarm setpoint to be at 1.00 +/- .25 mr/hr. The digital value can only be reduced by ones, tenths, or hundredths. The technician began with a value of 2.00 and decreased to 1.00 in one step, at which point the trip occurred. The technician logged the trip setting as 1.00, despite the fact that it could have been as high as 1.99, a conservative value. The inspector noted that while decreasing the digital value was cumbersome, the trip setting had to be confirmed by observing it tripped and untripped when apart by one hundredth. The technician agreed. Later, I&C supervision also agreed and stated that technicians would be instructed on this point.
- F. During a monthly diesel generator surveillance on April 27, the test was terminated due to high differential pressure on the lubricating oil strainer, and the strainer was subsequently cleaned. While reviewing the previous surveillance data to determine the differential pressure, the inspector noted that a higher than normal pressure had been recorded and a work request had been initiated to clean the strainer. Later, the inspector was informed that the cleaning was not done prior to the second test, because the work request had been misplaced when the planning office was moved during the intervening period. Also, the assigned planner had left PSE&G, and the newly assigned planner was unaware of the work request. This error is also discussed in Section 8.A.
- G. (Closed) Unresolved Item 87-08-06; Inadequate implementation of the scaffolding program. Scaffolding was last reviewed in NRC Inspection Report 50-354/88-22, and deficiencies were identified in the Scaffold Control Log, the completion of Scaffold Variation Requests and the timely completion of the required periodic inspection of the scaffolds. The inspector reviewed the Scaffold Control Log and several scaffolds on the 54 foot level of the reactor building. The information in the Scaffold Control Log corresponded to the existing scaffolds, the required Scaffold Variation Requests were completed, and periodic 48 hour inspections were documented. This item is closed.

5. EMERGENCY PREPAREDNESS (71707)

The inspector reviewed the performance of PSE&G's C team of emergency response personnel during the Hope Creek Emergency Drill H89-01 held on March 22, 1989. The drill involved full exercising of station personnel and included declaration of a General Emergency and a simulated offsite release. The inspector noted that problem identification and resolution during the drill were good and that communications were timely and accurate. The inspector concluded that this practice drill was an effective training tool and had improved the performance capabilities of emergency response personnel.

6. SECURITY (71707)

PSE&G's compliance with the security program was verified on a periodic basis, including adequacy of staffing, entry control, alarm stations, and physical boundaries. There were no noteworthy findings in this area.

From April 10 to April 14, the inspector participated in the Regulatory Effectiveness Review (RER), which assessed the detection, assessment, and response capability of the Hope Creek security systems in a nontypical manner. The report of the review's findings was issued on April 26, 1989. PSE&G has committed to address the RER findings.

7. ENGINEERING/TECHNICAL SUPPORT

- A. The inspector reviewed the status of ongoing PSE&G evaluations of Rosemount transmitters susceptible to leaking sensor oil problems. The PSE&G evaluations are being coordinated between Hope Creek, Salem, and corporate engineering staffs. At Hope Creek three transmitters have been replaced based on having the highest susceptibility to the problem, and numerous other transmitters remain under evaluation. Also, PSE&G personnel participated in a meeting in NRC headquarters with Rosemount and other utilities on the problem. The inspector concluded that PSE&G's efforts on this issue have been responsive and thorough.
- B. PSE&G's onsite system engineering group has implemented a computer supported system trending program. This program currently trends 52 plant systems (34 mechanical and 18 electrical) and approximately 875 parameters on a weekly basis. PSE&G intends that these monitoring efforts will enhance the timely evaluation of operating systems and aid in prioritizing maintenance work. Although the trending program has only recently been implemented, it identified a low setpoint in a heater controller of the electrohydraulic control system, which had degraded system performance. This commitment of time and resources to anticipate and prevent problems rather than react to them is exemplary.

- C. During the inspector's review of the loss of shutdown cooling discussed in Section 4.3.B and LER 89-05, the inspector noted that to understand the controls of the applicable valves, three design drawings must be reviewed. Further, some of the leads are identified by different designations on different drawings. This makes the process of understanding the controls complicated and cumbersome and may have contributed to the error during the procedure change.

The inspector was shown composite drawings, on which the power and controls information for each valve were integrated onto a single drawing. This considerably facilitated understanding the design. However, the inspector was informed that the composite drawings were usable for information only, as they had not been updated and design changes had not been included. In discussions with engineering management, the inspector encouraged resumption of efforts to maintain the composite drawings up-to-date. Engineering management stated that plans for a pilot project to maintain the composite drawings current are being evaluated and will be decided based on the best usage of available resources.

8. SAFETY ASSESSMENT/QUALITY VERIFICATION

- A. During discussions with plant management, the inspector noted that there appeared to be a higher incidence of minor personnel errors identified by NRC inspectors, i.e., misplaced work request, poor testing technique, and out of calibration testing equipment. The errors had minimal significance by themselves, but the accumulation of these errors represented an adverse short term trend and a degradation from Hope Creek's normally excellent record of doing tasks correctly and self-identifying the errors. The inspectors will continue to review this area to determine whether these errors represent isolated incidents or deterioration of performance.
- B. The inspectors noted commendable efforts within the engineering support area regarding the follow-up on Rosemount transmitter concerns and the monitoring of system performance, discussed above.

9. LICENSEE EVENT REPORT (LER) AND OPEN ITEM FOLLOW-UP (92700)

- A. PSE&G submitted the following event reports and periodic reports, which were reviewed for accuracy and adequacy of the evaluation.

Monthly Operating Reports for February 1989 and March 1989.

LER 89-03	Initiation of Invalid Channel B Loss of Coolant Accident Signal During Testing Results in ESF Actuation; Discussed in NRC Inspection Report 50-354/89-02 Section 4.3.B.
-----------	---

- LER 89-04 Alternate Rod Insertion Initiation (No Rod Motion) Due to Procedure Inadequacy in a Design Change Support Procedure; Discussed in NRC Inspection Report 50-453/89-02 Section 4.2 C.
- LER 89-05 Isolation of Residual Heat Removal System During Testing Results in Loss of Shutdown Cooling for 12 Minutes; Discussed in Section 4.3.B of this report.
- LER 89-06 Twenty Six Surveillance Procedures Exceed Required Intervals Due to Interpretation of a Technical Specification Definition; Discussed in Section 4.3.C of this report.
- LER 89-07 Both Control Room Emergency Filtration Ventilation Trains Inoperable Due to Separate and Unrelated Equipment Failures Resulting in Entering Technical Specification 3.0.3; Discussed in Section 4.3.D of this report.

B. The following previous inspection items were followed up during this inspection and are tabulated below for cross reference purposes.

Closed IFI 87-08-06 Section 4.3.G

11. EXIT INTERVIEW (30703)

The inspectors met with Mr. J. Nichols and other PSE&G personnel periodically and at the end of the inspection report period to summarize the scope and findings of their inspection activities.

Based on Region I review and discussions with PSE&G, it was determined that this report does not contain information subject to 10 CFR 2 restrictions.