

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-272/94-24
50-311/94-24

License Nos. DPR-70
DPR-75

Licensee: Public Service Electric and Gas Company
P.O. Box 236
Hancocks Bridge, New Jersey 08038

Facility: Salem Nuclear Generating Station

Dates: September 18, 1994 - November 5, 1994

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11-11-94
Date

Inspection Summary:

This inspection report documents inspections to assure public health and safety during day and backshift hours of station activities, including: operations, radiological controls, maintenance and surveillance testing, emergency preparedness, security, engineering/technical support, and safety assessment/quality verification. The Executive Summary delineates the inspection findings and conclusions.

SALEM EXECUTIVE SUMMARY

Salem Inspection Reports 50-272/94-24; 50-311/94-24

September 18, 1994 - November 5, 1994

OPERATIONS (Modules 40500, 60705, 60710, 71707, 92701, 92901)

Salem management took appropriate action in response to an operator inadvertently closing two Main Steam Isolation Valves. The inspector observed good housekeeping in containment, excellent radiation protection pre-job briefings and coverage, and thorough inspection and detailed deficiency documentation by the Containment Walkdown Team. The licensee took appropriate corrective actions for peeling paint in containment and lube oil leakage from reactor coolant pump oil collection systems. Plant staff conducted fuel handling activities safely. Inspectors noted management oversight of refueling activities. For an hour and 32 minutes during irradiated fuel movements, the licensee failed to assure containment integrity as required by Technical Specification 3.9.4. This is an apparent violation. In response to identification of missed check valve surveillances, operations performed an operability determination of significantly improved quality over previous efforts.

MAINTENANCE AND SURVEILLANCE (Modules 61726, 62703, 92902, TI 2515/125)

PSE&G did not take adequate corrective action to preclude recurrence of work control inadequacies that occurred during the Salem Unit 1 fall 1993 refueling outage. As a result, on three occasions during the reporting period, workers improperly performed outage work activities which contributed to the potential for serious personnel injury.

The plant staff did not adequately address vacuum pump inlet valve deficiencies. As a result, valve mis-operation caused a reduction of condenser vacuum. Quick response by operators precluded a reactor trip.

The inspectors concluded that Salem had adequate controls to prevent foreign materials from entering and remaining in safety systems. Plant staff properly planned, controlled and conducted complex main steam safety relief valve testing.

Operators failed to perform a nuclear instrumentation calorimetric within the time required by Technical Specifications. This is an apparent violation. Maintenance staff and supervisors performed outage maintenance on the 2C diesel generator carefully and appropriately. Poor communication between system engineers and operations concerning centrifugal charging pump vibrations resulted in a requirement for operators to conduct an accelerated Salem Unit 2 shut down to comply with Technical Specifications.

ENGINEERING AND TECHNICAL SUPPORT (Modules 37551, 71707, 92700,)

The licensee initially failed to critically evaluate a condition that had the potential to involve corrosion on the auxiliary feedwater (AFW) piping. Once they initiated an investigation, the licensee thoroughly and adequately addressed the piping concerns.

Marginal control air system performance continued to challenge normal plant operation. The inspectors concluded that the licensee responded appropriately to the inadequately tapped fuel header bolt holes and inadequately torqued fuel oil header bolts.

The licensee developed a reasonable basis to conclude that sustained Salem Unit 2 operation at levels up to 102.6% did not compromise plant safety. However, failure to consider the worst case implications of increased electric generation indicated weaknesses in problem identification, resolution, and safety perspective. Failure to promptly identify and correct the overpower condition is a apparent violation.

PLANT SUPPORT (Modules 71707, 71750, 92700)

Radiation Protection demonstrated consistently strong performance throughout the inspection period. Inspectors noted a large number of corrective maintenance activities for the plant radiation monitors, though the trend has been decreasing for the last three years. The inspectors concluded that the frequent degraded condition of the radiation monitors tended to be a constant distraction to operators and required frequent compensatory action. The inspectors also noted that plant management recently increased efforts to improve radiation monitoring equipment reliability through improved maintenance and greater emphasis on developing a long term solution.

A security guard failed to control access to a vital area. This is an apparent violation of security plan requirements. On September 7, PSE&G announced that they had named Mr. Leon Eliason President and Chief Nuclear Officer of the newly formed PSE&G Nuclear Business Unit. In addition, on September 8, PSE&G announced that they had named Mr. John Summers to the position of Salem Mechanical Maintenance Manager for a one year period.

The inspectors noted that Salem and Engineering and Plant Betterment (E&PB) managers had performed various levels of analysis to identify areas for performance improvement. The E&PB and Operations analyses and improvement plans, in particular, demonstrated thorough analysis and carefully mapped out action plans. Other departments had less formal plans with fewer means to track improvement. Senior management stated that measures had been initiated to establish a more uniform approach to improving performance.

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DETAILS

1.0 SUMMARY OF OPERATIONS

1.1 Salem Units 1 and 2

Unit 1 operated at power throughout the report period.

Unit 2 began the period at 100% power. On September 22, 1994, as a result of high centrifugal charging pump vibration, operators shut the unit down to comply with a Technical Specification action statement. On September 27, operators commenced a reactor startup. On September 29, operators manually tripped the reactor when an operator inadvertently closed two main steam isolation valves at 30% power. On September 30, operators again commenced a reactor startup and returned the unit to 100% on October 3. On October 13, operators commenced a shutdown for the eighth refueling outage. The unit remained in the outage through the end of the report period.

2.0 OPERATIONS

2.1 Inspection Activities

The inspectors verified that Public Service Electric and Gas (PSE&G) operated the facilities safely and in conformance with regulatory requirements. The inspectors evaluated PSE&G management control by direct observation of activities, tours of the facilities, interviews and discussions with personnel, independent verification of safety system status and Technical Specification compliance, and review of facility records. The inspectors performed normal and back shift inspections, including 22 hours of deep back shift inspections.

2.2 Inspection Findings and Significant Plant Events

A. Inadvertent Main Steam Isolation Valve (MSIV) Closure

On September 29, with Salem Unit 2 at 30% power during a startup, a control room operator inadvertently closed two of the four MSIVs. The operators recognized the error as the valves began to close, and manually tripped the reactor in anticipation of a reactor trip on high reactor coolant system pressure in the pressurizer. The plant responded as designed. Operations management reviewed the event and the performance of the operators. They concluded that the operator had been instructed to close the MSIV warming valves. He had correctly repeated back the instructions to close the warming valves, then removed a protective cover intended to prevent inadvertent MSIV closure, and closed the valves. Management concluded that operator recognition of the error and action to trip the reactor had been prompt and appropriate. Based on past performance of the operator making the error, including an evaluation of previous performance, and at the request of the operator, operations management removed the operator from duties involving direct control of plant equipment. The inspectors considered operations management actions appropriate.

B. Containment Walkdown

On October 14, 1994, the licensee conducted S2.OP-PT.CAN-0001, *Containment Walkdown*, at the onset of their refueling outage. The inspector observed good housekeeping in containment, excellent radiation protection pre-job briefings and coverage, and thorough inspection and detailed deficiency documentation by the Containment Walkdown Team. The inspector noted that peeling paint on walls and floors posed a potential for containment sump clogging. The inspector determined that the licensee identified the peeling paint, and planned to address it during the outage. The inspector observed good management oversight and attention in this area.

In addition, the inspector noted a significant amount of lube oil coating the reactor coolant pump (RCP) platforms in containment. The oily platforms presented a personnel safety concern, and a thin coating of oil on the stator windings presented a potential reliability concern. The inspector noted that NRC Information Notice 94-58, *Reactor Coolant Pump Lube Oil Fire*, identified that some RCP oil collection systems present fire hazards. Oil leaking from the lube oil system may come in contact with either (1) surfaces that are hot enough to ignite the oil, or (2) an electrical source of ignition. The licensee removed the oil to address the personnel safety hazard, and planned to take action to address the oil leaking from the collection system. The inspector noted good communication between maintenance, engineering, and vendor representatives and considered that the licensee had taken appropriate action.

C. Refueling Activities

At 11:38 p.m. on October 24, 1994, operators began to move fuel from the reactor core to the spent fuel pool. At 2:35 p.m. on October 27, operations completed core offload. On October 31, reactor engineering, with Westinghouse support, commenced fuel rod ultrasonic and visual inspection for the offloaded core. At the end of the inspection period they had inspected 153 of 193 assemblies. Westinghouse preliminary findings indicated eight leaking peripheral fuel rods. The inspector noted that the position of the failed rods correlated to Westinghouse findings from the Unit 2 seventh refueling outage. (Refer to NRC Inspection Report 50-272&311/93-15)

The inspector observed good control of preparations for refueling, new fuel inspection, core off-load, and failed fuel inspection. The inspector noted that, contrary to an internal commitment, the training program for refueling operators did not review previous fuel handling problems experienced at during the Hope Creek outage. Operations identified a weakness in the tracking and implementation of this training, took short-term actions to provide additional focused training, and initiated a review of refueling training practices for long-term improvement. The inspector noted Operations management and Quality Assurance direct involvement in refueling activities. However, on two occasions inspectors identified minor fuel handling equipment deficiencies known by equipment operators, but not conveyed to management.

With the unit defueled, operations relied upon the spent fuel cooling system, and the ability to connect the Unit 1 spent fuel pool (SFP) cooling to Unit 2. The licensee failed to implement a procedure change dated October 24, 1993, following an overflow of the Unit 2 SFP while operating with SFP cooling systems cross connected (See NRC Inspection Report 50-272&311/93-23). Upon recognition, the licensee immediately implemented the procedure change. The inspector noted that workers expertly conducted the fuel handling activities. The inspector observed good communication and coordination between the control room, containment, and the fuel handling building. The licensee, with Westinghouse support, safely off loaded the Unit 2 core.

D. Containment Isolation During Core Alterations

At 11:38 p.m. on October 24, 1994, operators began core alterations for the Unit 2 eighth refueling outage. At 1:10 a.m. on October 25, operations suspended core alterations upon discovery of open service water valves that provided access from containment directly to the auxiliary building. A Bechtel supervisor, working in containment, identified a release pathway from open service water vent valves in containment to open service water drain valves outside of containment. Previously, operators tagged the service water valves open for planned outage work on containment fan cooling units.

The licensee immediately suspended fuel handling operations upon identification of the potential release pathway affecting containment integrity. Operations isolated the service water drain valves outside containment and verified service water piping intact between isolation valves and containment. Operations reviewed all maintenance activities and conducted two independent reviews of tagged valve reports to insure containment integrity. Operations made an on-the-spot change to S2.OP-ST.CAN-0007, *Refueling Operations - Containment Isolation*, to require these independent reviews. At 6:05 a.m. on October 25, operations resumed fuel handling operations.

The inspector noted that the Bechtel supervisor demonstrated good oversight. The inspector determined that the licensee took prompt and appropriate corrective action to restore containment integrity. However, the inspector noted that the licensee took action to preclude recurrence that duplicated requirements existing at the time of the occurrence. The SRO failed to conduct an adequate review prior to the commencement of fuel alterations. The inspector determined that management did not clearly convey their expectations concerning the depth of review required to fully satisfy containment integrity under these conditions. The inspector concluded that failure to assure containment integrity during the performance of core alterations was a violation of Technical Specification 3.9.4. (VIO 50-311/94-24-01)

E. IPR25 Operability

As documented in NRC Inspection Report 50-272&311/94-21 on October 17, the licensee determined that they had not performed surveillances to verify the ability of check valves IPR25 and 2PR25 to permit flow under design conditions. The referenced report provides details of the surveillance requirements and the licensee failure to include the flow verification in the

In Service Testing (IST) program. As a result of the missed surveillance, the resident inspectors questioned whether the licensee concluded that valve 1PR25 for Salem Unit 1 could perform its design function, and how its potential inability to perform its intended function affected the associated ECCS systems (Containment Spray, Safety Injection, Residual Heat Removal). At the time, Salem Unit 2 was in a refueling outage.

The licensee completed an operability determination, and inspectors reviewed the analysis. The inspectors noted that the licensee, in performing the determination, had not identified the design flow and pressure conditions for valve operability. The licensee did not identify a basis to establish that the valve could permit required flow. In addition, the licensee did not establish the effect of insufficient flow through the valve on the associated ECCS systems. In response to the inspector questions, the licensee demonstrated that during quarterly ECCS testing the valve had permitted flow greater than the expected flow under worst case conditions. The licensee concluded that the missed surveillance did not result in plant operation with undetected degradation of ECCS systems.

The inspectors concluded the licensee appropriately determined that ECCS remained operable. The inspectors noted that the operability determinations utilized the recently established operations department guidance. The inspectors found that the operations department had significantly increased the quality of operability determinations. The inspectors also noted, however, that lack of consideration of the design conditions (such as pressure, flow, etc) required for operability of a component reduced the quality of the operability determination process.

3.0 MAINTENANCE AND SURVEILLANCE TESTING

3.1 Maintenance Observations

The inspectors observed selected maintenance activities on safety-related equipment to ascertain that the licensee conducted these activities in accordance with approved procedures, Technical Specifications, and appropriate industrial codes and standards.

The inspector observed portions of the following activities:

| <u>Unit</u> | <u>Work Order(WO) or Design Change Package (DCP)</u> | <u>Description</u> |
|-------------|--|--|
| Salem 2 | DCP 2EC-3220 | Replacement of Pressurizer Spray Valve Internals |
| Salem 2 | DCP 2EO-2334 | Change out of Trim Set for Pressurizer Relief Valves |
| Salem 2 | WO 940123023 | Inspection of Reactor Vessel Head Bolting |
| Salem 2 | WO 941020030 | CCHX Tube Inspection |

| | | |
|---------|--------------|---|
| Salem 2 | WO 941009005 | Service Water Pipe Inspection |
| Salem 2 | WO 940927031 | 21 Auxiliary Feedwater Pump Suction Check Valve Inspection |
| Salem 2 | DCP 2EC-2269 | Modifications to 21 Station Power Transformer |
| Salem 2 | DCP 2EC-3286 | Modify Diesel Generator Intake/Exhaust Piping |

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

3.2 Surveillance Observations

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.

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

| <u>Unit</u> | <u>Procedure No.</u> | <u>Test</u> |
|-------------|----------------------|---|
| Salem 1 | S1.OP-ST.CBV-0003 | Containment Systems - Cooling Systems |
| Salem 1 | S1.OP-ST.SW-001 | Inservice Testing Service Water Valves |
| Salem 1 | S1.OP-ST.CBV-0003 | Containment Systems - Cooling Systems |
| Salem 1 | S1.OP-ST.SW-001 | Inservice Testing Service Water Valves (CFCUs) |

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

3.3 Inspection Findings

A. Maintenance Performance Deficiencies

During the inspection period, the licensee reported several instances of deficient maintenance performance. No event had nuclear safety significance. However, the potential existed for serious industrial safety consequences.

On October 29, electricians cut through the wrong 4KV electrical cable. The work procedure directed the electricians to cut existing circulating water (CW) pump feeder cables into 4 foot sections. The modification package directed the electricians to remove the section from the cable tray prior to making the cut. As a result of interference of other cables and cable trays, the electrician decided to make a cut without removing the entire length of cable from the cable tray. Although he believed he had identified the correct cable, he incorrectly cut a 4KV feeder to the Chemical Treatment building. Fortunately, operators previously tagged out the feeder to support another work activity. Fortunately, the electrician did not sustain any injury.

On November 4, the site services personnel loaded Salem CW trash racks onto a flatbed truck, using a 55 ton crane. When the crane swung the load over the truck, it tipped over slightly injuring the crane operator. The licensee determined that the crane tipped due to inadequate implementation of controls designed to insure the outriggers were properly extended.

Also on November 4, a contractor working in the containment on a reactor coolant pump seal attempted to lower his tool box using improper rigging. The box slipped out of the sling and dropped 20 feet to the floor. The incident did not result in injury or damage to plant equipment. The contractor told the maintenance manager that he knew the rigging method was inadequate because he had dropped the tool box on two other occasions. The maintenance manager immediately removed the contractor from the job and stopped all work on the reactor coolant pump seal activity.

In response, the licensee stopped all work to review the events with workers, and reinforce the need to understand and adhere to work controls. In addition, the licensee took disciplinary action against responsible individuals, and emphasized the requirement for effective pre-job briefs. The inspectors noted that the above mishaps represent additional examples of poor work control similar to problems previously identified in NRC Inspection Report 50-272 and 311/93-23 and the subject of NRC Notice of Violation dated March 9, 1994. The inspectors noted that the examples described above and the examples described in NRC Inspection Report 93-23 demonstrate that licensee corrective action efforts have not been totally effective in precluding recurrences.

B. Loss of Condenser Vacuum

At 5:43 a.m. on October 4, 1994, equipment operators removed the no. 24 condenser vacuum pump from service for preventative maintenance. Control room operators noted decreasing condenser vacuum and reduced power. At 5:46 a.m. equipment operators returned the no. 24 vacuum pump to service. Control room operators initiated S2.OP-AB.Cond-0001, *Loss of Condenser Vacuum*. At 5:50 a.m. operators restored vacuum to normal and stopped the power reduction. The licensee determined that the no. 24 vacuum pump inlet valve (24AR25) failed to close when the vacuum pump was removed from service and subsequently caused the loss of vacuum.

The inspector observed that the west-side vacuum indication did not accurately reflect condenser pressure, complicating the response to the valve failure. The inspectors noted that operators identified the instrument problem on November 16, 1993, and further determined that on August 14, 1993, a work order was generated to investigate 24AR25, as the valve did not close when the pump was removed from service. The valve was presumed fixed, and the work order closed out, when yet another work order was generated for 24AR25 on July 3, 1994. The work order generated on July 3, 1994 remained open on October 4, 1994. The inspector concluded that plant staff had not adequately resolved this recurrent balance of plant equipment failure. As a result, it continued to unnecessarily challenge plant operation.

C. Foreign Material Exclusion (FME) Controls Temporary Inspection (TI 2515/125)

The inspectors reviewed licensee FME controls to determine if the licensee had adequate measures to prevent foreign material from inadvertently entering safety systems during maintenance activities, outages, and routine operations. The inspectors found that Nuclear Administration Procedure (NAP) 21, *System Cleanliness Program*, provided instructions on proper cleaning methods and provided instructions to prevent the intrusion of debris into the reactor vessel and into the primary system. Salem Maintenance Procedure GP.ZZ-6, *Tool and Miscellaneous Items Accountability and Closure Control*, provided instructions that prevent introduction of foreign material (debris, tools) into open systems. The procedure also provided instructions to account for tools, parts, and material during maintenance, testing, and inspection activities. Reactor Engineering (RE) procedures for refueling, fuel handling, and fuel repair referenced NAP-21 and ZZ-6 for controlling debris. The RE procedures include additional guidance for controlling activities involving the spent fuel pool and transfer pool.

Based on a licensee search of the Incident Report data base, the inspectors concluded that no documented instances of foreign material intrusion occurred within the previous year, nor did the inspectors recall the occurrence of foreign material intrusion problems. The inspectors observed maintenance activities to determine if foreign material exclusion control procedures were available and being followed. The inspector noted acceptable intrusion control during maintenance activities on the 2C emergency diesel generator, during fuel handling in the containment, and various other outage related activities. At the end of the report period, the licensee had completed less than half of the Salem Unit 2 refueling outage. Based on the amount of outage related equipment and material in containment, the inspectors concluded that effective containment closeout played a central role in preventing loose material from affecting safety. The inspectors could not assess the effectiveness of containment closeout prior to the end of the inspection report due to the duration of the outage.

Based on these observations, the inspector concluded that the licensee adequately prevented foreign material from entering safety systems during maintenance outage and routine activities.

D. Auxiliary Feed Pump Trip

On October 7, 1994, the No. 23 Auxiliary Feedwater (AFW) pump tripped during surveillance test S2.OP-SP.AF-003, *Inservice Testing - No. 23 Auxiliary Feedwater Pump*. Operators determined that the trip latch was not fully engaged and vibration on pump startup caused the trip valve to actuate.

Prior to running the pump, the procedure required the operator to press the emergency trip lever to manually trip the valve through the overspeed trip mechanism, insuring overspeed protection. On resetting the trip, the operator failed to properly engage the trip mechanism. The licensee determined that the procedure did not provide sufficient operator guidance to ensure that the operator fully seated the overspeed trip mechanism (OTM). The procedure provided additional verification only if the operator had not properly seated the OTM. The procedure had previously required the operator to properly seat the OTM, and the operator had no reason to suspect that he had not properly seated the OTM. The licensee changed the procedure to require the mechanical check to positively verify trip linkage engagement.

The inspector noted that the No. 23 AFW pump tripped in exactly the same manner on September 9, 1993. (See Inspection Report 50-311/93-21) Following that occurrence, the licensee made an "on-the-spot" change to the surveillance to ensure proper trip mechanism engagement. However, as noted above, the modified procedure did not require adequate engagement verification.

The inspector determined that the October 7, pump trip had no safety consequence since the pump was inoperable for the surveillance test. However, the inspector noted that similar misalignment upon resetting the trip valve at the conclusion of the surveillance could result in an AFW pump trip for a pump start under accident conditions. The inspector observed that improper OTM engagement following completion of a surveillance would be masked by the requirement to manually trip the pump at the beginning of the next surveillance. The inspector planned to continue to review the adequacy of the licensee's evaluation of the AFW pump surveillance activity. (IFI 50-311/94-24-02)

E. Missed Surveillance for Nuclear Instrumentation System (NIS)

At 7:45 a.m. on October 13, during a Unit 2 shut down in preparation for the outage, a technician asked the operating crew for permission to perform a heat balance calibration of the NIS. Technical Specification (TS) 4.3.1.1.1, Table 4.3-1 requires plant staff to perform the calibration once each 24 hours when power is above 15%. Plant staff performed the previous calibration at 9:51 a.m. on October 12. Believing, incorrectly, that the calibration was a daily requirement, the shift supervisor stated that he expected power to be below 15% by the end of the day, therefore, the calorimetric would not be required. The operators continued the plant shutdown, reducing plant power below 15% after 9:51 p.m., and did not perform a calorimetric during a period of more than 36 hours. Failure to perform the NIS heat balance calibration is a violation of TS 4.3.1.1.1. (VIO 50-311/94-24-03)

F. Main Steam Safety Relief Valve Testing

On October 14, 1994, the inspector observed main steam safety valve testing in place. The inspector noted that plant staff properly planned, carefully controlled, and safely conducted the complex evolution. In addition, the inspector noted good coordination and involvement by maintenance, system engineering, quality assurance, operations, and maintenance management.

G. 2C Emergency Diesel Generator Maintenance Activities

On October 16, 1994, Salem maintenance staff began a 2C emergency diesel generator (EDG) outage to perform preventative maintenance, slip ring machining, air start system piping and valve replacement, and cylinder liner replacement. Maintenance technicians successfully completed all scheduled maintenance. On October 30, operations declared the 2C EDG operable following satisfactory post-maintenance and operability testing.

Maintenance personnel replaced both 2C diesel air start receiver check valves and drain valves. In addition, maintenance replaced the carbon steel piping between the air compressor and air start receiver in kind. Maintenance replaced 8 cylinder liners, which were previously replaced in January 1994, following discovery of a cracked liner in the 2C EDG (see NRC Inspection Report 50-272&311/93-27). The replacement liners used in January arrived without qualification documentation. In January, maintenance bored several small holes in a low stress area to qualify the liners for safety-related use. The licensee planned to evaluate the removed liners for stress induced cracking. The results of this evaluation has the potential of affecting 1B EDG which also contains cylinder liners with bored metallurgic sample holes.

The inspector determined that the licensee properly planned and conducted the maintenance. The inspector observed good work practices, excellent foreign material exclusion (FME) practices, good procedure use, and effective PSE&G supervision in the field.

H. Maintenance of No. 21 Centrifugal Charging Pump

On September 19, plant staff identified inadequate coupler spacing in the No. 21 charging pump speed increaser. After adjusting the spacing, engineering staff noted elevated vibration readings during the post maintenance test (PMT). The readings had not reached the required action range specified in the IST program. As a result system engineers concluded that the pump met the post maintenance acceptance criteria for operability, since the PMT did not include acceptance criteria for vibration associated with the speed increaser. The system engineers did not inform operations staff of the increased vibration. The system engineers did, however, request that operations run the pump again on night shift to permit gathering more extensive vibration data. During a two hour run, the system engineering staff found that the vibration had significantly increased. After approximately two hours of data review, they informed the operations staff that the pump should be considered inoperable. As a result of the system engineering staff input, operations declared the pump inoperable. They concluded that the pump had been inoperable since they entered the Technical Specification LCO action statement

to begin maintenance, three days earlier. As a result, operations staff performed an accelerated shut down of Salem Unit 2 to meet the requirements of Technical Specification 3.0.3.

The inspectors concluded that operations staff, when informed of the vibration concerns, properly interpreted Technical Specification requirements and appropriately shut down Salem Unit 2. The inspectors also concluded that system engineering unnecessarily imposed the requirement for an accelerated shut down on the operations staff. The system engineers failed to promptly and appropriately assess the impact of high vibration on the operability of the centrifugal charging pump. The surveillance procedure did not consider vibration of the speed increaser as part of the acceptance criteria. The inspectors concluded, however, that system engineering and planning staff inappropriately failed to consider vibration as part of the required acceptance criteria, since maintenance with the potential for adversely affecting the speed increaser had been performed.

4.0 ENGINEERING

A. Suspected Auxiliary Feedwater Piping Degradation

On September 6, 1994, the inspector informed the system engineer of watermarks running down the wall beneath the no. 22 auxiliary feedwater (AFW) piping penetration in the main steam isolation valve (MSIV) room on Salem Unit 2. The engineer considered the leakage normal and attributed it to ground water leakage past the Williamson penetration seal. On September 9, the inspector observed standing water in the MSIV room beneath the AFW penetration. The inspector obtained rust from between the AFW piping and the penetration walls. Based on the presence of rust, the system engineer examined the piping and penetration more closely and determined that ground water leakage might be eroding the AFW pipe coating. The system engineer initiated ultrasonic testing (UT) to evaluate AFW piping wall thickness.

On September 19, the inspector requested an operability evaluation. The licensee appropriately evaluated AFW operability. On September 21, the Plant Manager ordered a detailed evaluation of the AFW piping. On September 22, UT examination found the wall thickness greater than the minimum required wall thickness and within manufacturing tolerances. Chemical analysis of water and dirt samples from the pipe penetration were inconclusive. During excavation of the outside area around the penetration the licensee observed evidence of water infiltration into the penetration, and determined that the seals were inadequately installed. Engineering did not find any indication of pressure boundary leakage or degradation. The licensee replaced the penetration seals and declared the AFW piping operable.

The inspector concluded that the licensee demonstrated weak safety focus in their initial lack of timely response to a potential safety issue. Subsequently, the licensee conducted a very thorough AFW piping evaluation. The inspector noted that the penetration still leaked after completion of the seal repairs, but determined that no immediate AFW piping concern existed.

B. Control Air Abnormalities

The inspectors documented control air system problems in NRC Inspection Report 50-272 and 311/94-19. The inspectors noted the three additional examples of control air degraded performance during this inspection period.

On October 5, 1994, during the performance of a control air surveillance test, the no. 2 emergency air compressor tripped immediately on low oil pressure due to an initial oil pressure fluctuation. Subsequent maintenance testing demonstrated acceptable oil pressure, within the required time, to prevent tripping of the compressor on startup. On October 28, while preparing to remove the no. 2 station air compressor (SAC) from service, for corrective maintenance, the no. 3 SAC failed to properly load. Maintenance completed prolonged maintenance (16 days) on no. 3 SAC on October 19. The station air and control air header pressures dropped, the no. 1 emergency control air compressor auto started, and the operators began to restore no. 2 SAC. Within 25 minutes, operators restored the no. 2 SAC and returned no. 3 SAC to standby status. On October 31, maintenance took the no. 11 control air dryer out of service for preventive maintenance and "B" control air header pressure dropped to 86 psig. Normal control air pressure is 90-120 psig.

The inspectors determined that plant staff took immediate corrective actions in response to control air problems as required by procedure and Technical Specification requirements. However, marginal control air system performance continues to provide challenges to plant operation.

C. Diesel Generator Fuel Oil Supply Header Bolt Problems

During the 2C emergency diesel generator (EDG) maintenance outage, maintenance personnel discovered that the diesel vendor had not tapped some fuel supply header bolt holes sufficiently to permit full bolt insertion. (Each cylinder has two such bolts.) The licensee experienced previous problems with the fuel header bolts. On three occasions (April 30, 1993; November 13, 1993; and September 25, 1994) workers found bolts broken in two pieces following diesel runs. A PSE&G Research and Testing laboratory evaluation, dated March 10, 1994, determined that fatigue caused the first two failures. As a result of the discovery, engineering suspected that inadequately tapped bolt holes caused the fatigue failures. Maintenance tapped the holes deeper in the 2B and 2C EDGs and planned to take the same action for 2A EDG during its outage window. The maintenance staff verified the full insertion of all fuel supply header bolts in the Salem Unit 1 EDGs by visual and physical inspection. The licensee is evaluating the condition for reportability under 10 CFR Part 21.

On October 30, 1994, while running the 1A EDG to demonstrate operability after corrective maintenance, an equipment operator emergency tripped the 1A EDG due to fuel oil spraying out from under the fuel injection pump covers. Operators were running the 1A EDG to satisfy Technical Specification requirements due to corrective maintenance on the 1C EDG. Maintenance found two fuel header bolts backed completely out on one cylinder. Although the fuel oil supply line was still aligned for that cylinder fuel injection, fuel oil leaked out, and overflowed eight adjacent fuel injector pump cover plates. The licensee noted no affect on engine performance, however, the fuel spraying on the running

engine presented a threat of fire. The licensee concluded that the bolts were not adequately tightened previously and vibrated loose. In response, the licensee verified that all the fuel supply header bolts had been torqued to 14-16 ft-lbs.

The inspectors concluded that the licensee responded appropriately to the inadequately tapped fuel header bolt holes and inadequately torqued fuel oil header bolts.

D. Sustained Operation of Salem Unit 2 above 3411 Megawatts (thermal)

As documented in NRC Inspection Report 50-272&311/94-01, the licensee found that they had operated Salem Unit 2 at thermal power levels up to 101.4% (3459 MWth) power for sustained periods during operating cycle 7, and at sustained thermal power levels up to 102.58% (3499 MWth) + or - 7% during operating cycle 8. The licensee attributed the immediate cause of the overpower operation to inaccurate feedwater flow indication. The licensee concluded that they did not immediately recognize the overpower condition because they attributed the increased electric output to plant improvements and calculation uncertainties.

The licensee, with assistance from Westinghouse, performed extensive evaluation of the effects of sustained operation at 104.5% power (3565 MWth). The licensee concluded that sustained operation at 104.5% power did not compromise plant safety since it did not affect some analyzed accidents, and detailed analyses for the remaining analyzed accidents concluded that sufficient margin existed to offset the adverse consequences resulting from overpower operation. The licensee also concluded that they did not recognize the possible connection between increased generator output and decreased calculated reactor coolant system (RCS) flow rate. The licensee identified a number of corrective actions, including inspection and root cause analysis of the inaccurate feedwater flow indication, replacement of the feedwater flow nozzles, establishing a trending program for statepoint and calorimetric data, and improved use of operating experience feedback.

The inspectors concluded that the PSE&G assessment of the safety significance of operating at greater than 100% power reasonably concluded that the safe operation of the plant had not been compromised. However, since the licensee did not assess the operation at 102.58% power until after the fact, the licensee operated the plant in an unanalyzed condition for sustained periods during operating cycle 8. In addition, the licensee did not promptly identify that the increased electric output resulted from increased reactor power, a potential safety problem. The licensee had sufficient empirical data available (RCS flow and core temperature change) to allow them to challenge the accuracy of the feedwater flow indication during operating cycle 7 and 8. The analysis, however, failed to question the accuracy of feedwater flow indication. The lack of questioning was due, in part, to the expectation that the increased electric generation resulted from recent improvements in balance of plant equipment. In summary, the licensee failure to consider the worst case implications of the increased electric generation indicated weaknesses in

problem identification, resolution, and safety perspective. Failure to promptly identify and correct a significant condition adverse to quality is a violation of 10 CFR 50, Appendix B, Criterion XVI. (VIO 50-272&311/94-24-04) (CLOSED: URI 50-272&311/94-01-02)

5.0 PLANT SUPPORT

5.1 Radiological Controls and Chemistry

5.1.1 Inspections Findings

A. Radiation Protection Outage Activities

The inspector observed consistently strong Radiation Protection performance throughout the inspection period. Radiation protection staff conducted good radiation worker briefings, properly posted radiation and contaminated areas, and generally assured excellence in radiological worker practices. Radiation protection technicians actively monitored the radiologically controlled area, were very knowledgeable of plant conditions and radiological practices, and strictly controlled access point entries and exits. The inspector noted good radiation protection management supervision involvement at the control points and in the plant, especially in containment.

B. Radiation Monitoring System Reliability

During the past year, inspectors have noted a large number of corrective maintenance activities for the plant radiation monitors. Based on a review of documented work activities, the inspectors noted the following numbers of corrective maintenance activities for the Salem radiation monitors:

RMS Corrective Maintenance

| | Salem 1 | Salem 2 |
|-------------------|---------|---------|
| 1/1/91 - 12/31/91 | 383 | 379 |
| 1/1/92 - 12/31/92 | 280 | 365 |
| 10/1/93 - 9/30/94 | 216 | 305 |

The inspectors concluded that the frequent degraded condition of the radiation monitors posed unnecessary distraction to operations and maintenance staff, even though the frequency of repair trended down over the past three years. The inspectors also noted that plant management recently increased efforts to improve radiation monitoring equipment reliability through improved maintenance and increased emphasis on developing a long term solution.

5.2 Emergency Preparedness

5.2.1 Open Item Followup

(Closed) Unresolved Item (50-272 and 311/92-17-01)

Following an unplanned loss of shutdown cooling at Hope Creek in October 1992, the inspectors reviewed the event and PSE&G's evaluation of reportability under 10 CFR 50.72 requirements. The inspector also reviewed Salem's relevant reporting requirements.

The inspector reviewed PSE&G's current procedures and expectations concerning reportability under 10 CFR 50.72 for loss of shutdown cooling and decay heat removal. The criteria for making a non-emergency four hour report were, a) the event was an engineered safety feature (ESF) actuation and b) the event was one which alone could have prevented the fulfillment of a safety function needed to remove residual heat. The inspector determined that these criteria met the applicable reporting requirements of 10 CFR 50.72, paragraph (b)(2). The inspector concluded that the licensee was in compliance with NRC requirements and adequate means existed to properly document loss of shutdown cooling events. This item is closed.

5.3 Security

5.3.1 Inspection Findings

On October 24, 1994, a guard providing control of a temporary access to the no. 2C emergency diesel generator room, failed to properly verify that the inspectors had been authorized access to the EDG. Post orders, issued to provide instructions for access control, instructed the guard to verify that each person needing access to the EDG room, had been granted authorization prior to permitting entry. In response to the inadequate performance, a security supervisor took immediate action to insure compliance with the requirement for verification of authorization to the vital area. In addition, the security contractor took appropriate disciplinary action and conducted remedial training for the guard. In addition, the contractor reviewed the incident with the guard force. Failure to insure proper authorization to a vital area prior to granting access is a violation. (VIO 50-272&311/94-24-05)

5.4 Safety Assessment and Quality Verification

5.4.1 Inspection Findings

A. PSE&G Management Changes

On September 8, PSE&G management announced that they had acquired the services of John Summers to fill the position of Manager, Salem Mechanical Maintenance on a temporary basis (1 year). In addition, on September 7, PSE&G announced that the nuclear division had been re-established as a separate PSE&G business unit headed by President and Chief Nuclear Officer, Leon Eliason.

B. Management Assessment of Salem Performance

The inspectors interviewed the Vice President of Operations and Salem general manager, the Salem department managers, and the Vice President and managers of the corporate engineering organization. The inspectors conducted the interviews to determine and assess the process for effecting change in the performance of the Salem staff and supporting organizations. The inspectors requested that the managers relate the areas identified as most in need of change, the basis for determining the areas needing change, and the action planned to generate the required change.

The inspectors learned that corporate engineering managers had performed extensive research specific to their organization to identify areas for improvement. The results identified weaknesses in leadership ability, the need for process improvements, and the need for organizational changes. Corporate engineering developed a comprehensive plan to address the identified areas for improvement.

Some Salem managers also performed independent analysis of their organizations to identify the areas in need of change. The operations department, for example, identified processes and personnel performance issues among the areas for improvement. The operations staff demonstrated significant ownership and pride in the documented plan for improving operations performance.

Other Salem managers had also identified areas for improvement. The sources of the identification process included reports issued by the NRC and other outside organizations, and Comprehensive Performance Assessment Team results. The inspectors observed that the managers identified many fruitful areas for improvement. The inspectors also noted that some of the managers did not have direct ownership for the source of the areas identified for improvement, and had not established a plan for achieving the identified improvements. Senior management stated that they had initiated efforts to establish a more uniform approach to improving performance.

6.0 LICENSEE EVENT REPORTS (LER), PERIODIC AND SPECIAL REPORTS, AND OPEN ITEM FOLLOWUP

6.1 LERs and Reports

The Salem Monthly Operating Reports for August and September were reviewed for accuracy and content, and were determined to be acceptable. The inspectors also reviewed the following LERs to determine whether the licensee took the corrective actions stated in the report, and to determine if licensee responses to the events were adequate, met regulatory requirements conditions, and commitments:

Salem LERsUnit 1

| <u>Number</u> | <u>Event Date</u> | <u>Description</u> |
|---------------|-------------------|--|
| LER 94-14 | August 25, 1994 | Licensee entered Technical Specification 3.0.3 to permit maintenance on the Analog Rod Position Indication System. |
| LER 94-08 | August 28, 1994 | Late performance of quarterly channel functional test. |

Unit 2

| | | |
|-----------|--------------------|---|
| LER 94-10 | September 22, 1994 | Controlled reactor shutdown due to no. 21 centrifugal charging pump being inoperable greater than 72 hours. |
| LER 94-11 | September 29, 1994 | Manually initiated reactor trip following unplanned closure of two main steam isolation valves. |

For the LERs listed above, the inspectors determined that there were no violations or deviations, and considered the LERs closed.

6.2 Open Items

The inspector reviewed the following previous inspection items during this inspection. These items are tabulated below for cross reference purposes.

| <u>Number</u> | <u>Report Section</u> | <u>Status</u> |
|-------------------|-----------------------|---|
| 272& 311/92-17-01 | 5.2.2.A | Closed |
| 272&311/94-01-02 | 4.D | Administratively closed and re-opened as a violation (272&311/94-24-04) |

7.0 EXIT INTERVIEWS/MEETINGS**7.1 Resident Exit Meeting**

The inspectors met with Mr. J. Hagan 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 NRC Region I review and discussions with PSE&G, it was determined that this report does not contain information subject to 10 CFR 2 restrictions.

7.2 Salem Specialist Entrance and Exit Meetings

| <u>Date(s)</u> | <u>Subject</u> | <u>Inspection Report No.</u> | <u>Reporting Inspector</u> |
|-----------------|------------------------|------------------------------|----------------------------|
| 9/26-10/7/94 | Engineering Inspection | 50-272 and 311/94-27 | Calvert |
| 10/17-28/94 | MOV Inspection | 50-272 and 311/94-26 | Prividy |
| 10/17-21/94 | Effluents Inspection | 50-272 and 311/94-28 | Peluso |
| 10/24-26/94 | Emergency Preparedness | 50-272 and 311/94-23 | Laughlin |
| 10/24 - 11/3/94 | Radcon Inspection | 50-272 and 311/94-30 | Noggle |

7.3 Management Meetings

On October 21, 1994, Charles W. Hehl, Director, Division of Radiation Safety and Safeguards, NRC, Region I, visited Salem Units 1 and 2 in preparation for the Systematic Assessment of Licensee Performance (SALP).