June 19, 2002

Mr. Harold W. Keiser
Chief Nuclear Officer and President
PSEG Nuclear LLC - N09
P. O. Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION - NRC INSPECTION REPORT 50-272/02-04, 50-311/02-04

Dear Mr. Keiser:

On May 11, 2002, the NRC completed an inspection of your Salem 1 & 2 reactor facilities. The enclosed report documents the inspection findings which were discussed on May 29, 2002, with Mr. L. Waldinger and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. Specifically, this inspection involved six weeks of resident inspection and region-based inspections of in-service inspection programs and the occupational radiation safety program. No findings of significance were identified.

Immediately following the terrorist attacks on the World Trade Center and the Pentagon, the NRC issued an advisory recommending that nuclear power plant licensees go to the highest level of security, and all promptly did so. With continued uncertainty about the possibility of additional terrorist activities, the Nation's nuclear power plants remain at the highest level of security and the NRC continues to monitor the situation. This advisory was followed by additional advisories, and although the specific actions are not releasable to the public, they generally include increased patrols, augmented security forces and capabilities, additional security posts, heightened coordination with law enforcement and military authorities, and more limited access of personnel and vehicles to the sites. The NRC has conducted various audits of your response to these advisories and your ability to respond to terrorist attacks with the capabilities of the current design basis threat (DBT). On February 25, 2002, the NRC issued an Order to all nuclear power plant licensees, requiring them to take certain additional interim compensatory measures to address the generalized high-level threat environment. With the issuance of the Order, we will evaluate PSEG Nuclear's compliance with these interim requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm.html (the Public Electronic Reading Room).

Sincerely,

/RA/

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

Enclosure: Inspection Report 50-272/02-04, 50-311/02-04
Attachment: Supplemental Information

Docket No. 50-272; 50-311
License No. DPR-70; DPR-75

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos:	50-272, 50-311
License Nos:	DPR-70, DPR-75
Report No:	50-272/2002-04, 50-311/2002-04
Licensee:	PSEG Nuclear LLC
Facility:	Salem Nuclear Generating Station, Units 1 & 2
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Dates:	March 31 - May 11, 2002
Inspectors:	Raymond K. Lorson, Senior Resident Inspector Fred L. Bower, Resident Inspector Thomas F. Burns, Reactor Inspector Michael C. Modes, Senior Reactor Inspector Joseph Furia, Senior Health Physicist
Approved By:	Glenn W. Meyer, Chief, Projects Branch 3 Division of Reactor Projects

Summary of Findings

IR 05000272-02-04, IR 05000311-02-04, on 3/31 - 5/11/02, Public Service Electric Gas Nuclear LLC, Salem Units 1 and 2. Resident Inspector Report.

The inspection was performed by resident inspectors, a regional radiation specialist, and two regional in-service inspection specialist inspectors. This inspection identified no findings of significance. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at http://www.nrc.gov/NRR/OVERSIGHT/index.html.

A. Inspector Identified Findings

No findings of significance were identified.

B. Licensee Identified Violations

A violation of very low significance, which was identified by PSEG Nuclear in Notification 20095802, has been reviewed by the inspector. Corrective actions, taken or planned by the licensee, appear reasonable. The violation is listed in section 40A7 of this report.

Report Details

SUMMARY OF PLANT STATUS

Unit 1 began the period at full power. On April 17 operators reduced power to 75% to support emergent cleaning of main condenser water boxes while a 13A circulating water pump planned maintenance outage was in-progress. On April 22 power was reduced to 60 percent when operators found that the 12 steam generator feed pump turbine exhaust vacuum sensing line was fractured. The sensing line was replaced and Unit 1 was returned to full power later the same day where it remained at the end of the period.

Unit 2 began the period at full power. On April 4, 2002, during the power reduction to begin the refueling outage, power was reduced from 92 percent to 61 percent due to a 21 steam generator feed pump trip. On April 5, Unit 2 was brought to cold shutdown in a controlled manner to begin the 2R12 refueling outage. At the end of the period, Unit 2 had been refueled and heated up to hot standby (Mode 3).

1. REACTOR SAFETY

Initiating Events, Mitigating Systems, and Barrier Integrity [Reactor - R]

R01 Adverse Weather

a. Inspection Scope

On May 2 the inspectors performed a walkdown of the Unit 1 and Unit 2 service water pump bays and intake structure to review whether PSEG Nuclear's preparations for projected severe weather conditions were appropriate and consistent with operations procedure, S1.OP-AB.ZZ-0001(Q), "Adverse Weather Conditions." The inspectors also reviewed Order 80045553 that PSEG Nuclear had initiated to review NRC identified deficiencies associated with some of the steps contained in procedure S1.OP-AB.ZZ-0001(Q).

b. Findings

No findings of significance were identified.

R04 Equipment Alignment

.1 Partial System Walkdowns

a. Inspection Scope

The inspectors performed partial walkdowns of redundant mitigating systems during equipment maintenance outages to confirm that the redundant systems were available to perform their intended safety functions, in acceptable material condition and protected by administrative controls. The following walkdowns were performed:

- 2A and 2C emergency diesel generators (EDGs) during a 2B EDG maintenance outage on April 5;

- 12 - 15 service water (SW) pumps while the 11 and 16 SW pumps were out for maintenance on May 2;
- 2SJ2 motor-operated valve and power supply on while the 2SJ1 (refueling water storage tank isolation valve to the charging pumps) motor operated valve was out for corrective maintenance on May 9.

b. Findings

No findings of significance were identified.

.2 Residual Heat Removal System Walkdown - Unit 2

a. Inspection Scope

The inspectors performed a complete system walkdown of the accessible Unit 2 residual heat removal (RHR) system components in the primary containment and in the auxiliary building to confirm that key system components were properly aligned, consistent with plant drawings, and in good material condition. The inspectors also reviewed the system health report, maintenance rule performance data, corrective action reports and interviewed the performance engineer to identify any outstanding issues that would challenge the operability of the system. The inspectors also reviewed notifications 20098600 and 20098624 that PSEG Nuclear initiated in response to some minor material deficiencies identified during the walkdown.

b. Findings

No findings of significance were identified.

R08 Inservice Inspection Activities

.1 Reactor Pressure Vessel Head Penetration Nozzles

a. Inspection Scope

The examination activities, performed in response to NRC Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," were inspected to the requirements established in Temporary Instruction, (TI) 2515/145. In addition, the inspector utilized guidance regarding examination requirements and test methods provided by PSEG Nuclear in the response to NRC Bulletin 2001-01, dated August 31, 2001. The details of the inspection scope and results are in Section 4OA5, as specified by the Temporary Instruction.

b. Findings

No findings of significance were identified.

.2 Steam Generator Inspection and ASME Code Repair Programs

a. Inspection Scope

The inspector reviewed the Salem Unit 2 Steam Generator Program, Steam Generator Aging Management Program, and Steam Generator Operational Assessment. The inspector reviewed the Reactor Vessel Inspection Report and discussed the implications of procedure field changes made to a pre-qualified Performance Demonstration Initiative procedure with the Salem in-service inspection staff. In addition the inspector reviewed the results of the inspection of the chemical volume control tank.

The inspector reviewed the Non-Code repair of the reactor water storage tank (RWST) to assure it was in compliance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Edition applicable to Salem Unit 2. With PSEG Nuclear personnnel the inspector discussed the continued acceptance by analysis of the minor leakage of a flaw in the RWST vessel wall behind the suction line doubler plate. Unresolved Item **(URI) 50-272/2001-07-01** remains open.

The inspector reviewed three ASME Repair and Replacement Work Orders: (1) repair of the RWST, (2) leaking service water header flange, and (3) the repair of a nuclear header and its related underground piping. The inspector reviewed three randomly selected corrective actions in the Steam Generator Program under Code 7000 to determine if actions related to the program were being addressed.

b. Findings

No findings of significance were identified.

R12 Maintenance Rule Implementation

a. Inspection Scope

The inspectors reviewed a local leak rate test failure on a power operated relief valve (PORV) accumulator isolation check valve to confirm that the failure was properly addressed per the maintenance rule and to ensure that appropriate corrective actions were implemented. The failure was determined to be the result of air leakage from a drain line isolation valve and fittings off of the PORV accumulator. PSEG Nuclear replaced the drain valves and repaired the tubing leaks and satisfactorily performed the leak test. The inspector reviewed the following documents to determine whether the as-found leakage rate would have prevented the PORV accumulators from performing their intended safety functions:

- Notification 20096790 that was initiated to document the test failure;
- Engineering Order 70024249 that evaluated the as-found condition of the PORV accumulators;

- Engineering Calculation S-C-CA-MEE-0433-01, “Comparison of Power Operated Relief Accumulator Air Usage Requirements Versus Control Air System Containment Accumulator Capacity;” and,
- PRA Notebook for the PORV system.

b. Findings

No findings of significance were identified.

R13 Maintenance Risk Assessments and Emergent Work Control

a. Inspection Scope

The inspectors reviewed selected maintenance activities through direct observation, document review (risk assessment reviews, operating logs, industry operating experience and notifications), and personnel interviews. This review was performed to determine whether PSEG Nuclear properly assessed and managed the risk, and performed these activities in accordance with applicable technical specification (TS) and work control requirements. The following activities were reviewed:

- Planned maintenance outage on the 2B EDG;
- Emergent maintenance performed to correct excessive packing leakage on the 16 SW pump and to correct a low differential pressure condition on the 11 SW pump; and,
- Emergent replacement of the 2SJ1 motor on May 9, following a test failure.

b. Findings

No findings of significance were identified.

R14 Personnel Performance During Nonroutine Plant Evolutions

.1 Unplanned Downpower Associated with the 12 Steam Generator Feedpump

a. Inspection Scope

On April 22 Unit 1 was rapidly reduced to 60 percent power when operators found a fractured vacuum sensing line on the 12 steam generator feed pump turbine exhaust. Three inches of vacuum were read on local indication and the low vacuum trip setpoint is set for atmospheric pressure. The inspectors reviewed Notification 20097598 that documented this event and the associated Transient Assessment Response Plan (TARP) report. The sensing line was replaced. The inspectors reviewed the operating logs and observed Unit 1 control room operations initiate a return to full power. The inspector noted that although the operators discussed reactivity management with fuels engineering personnel, they did not have a written reactivity plan for the power escalation. The inspectors reviewed Notification 20100953 that operations personnel initiated to review and disposition this observation. The inspectors also reviewed the apparent cause report documented in Order 70024464 for the tubing failure.

b. Findings

No findings of significance were identified.

.2 Unit 2 Shutdown for Refueling Outage and Excessive Cooldown Rate

a. Inspection Scope

At 0000 hours on April 5, 2002, Unit 2 was manually tripped to start the refueling outage (2R12). At 0207 hours on April 5, control room operators logged that Technical Specification Action Statement (TSAS) 3.4.10.1 was entered because the reactor coolant system (RCS) cooldown rate was 125 degrees from 0107 to 0207 and exceeded the limit of 100 degrees per hour. The inspectors reviewed the following documents:

- S2.OP-IO.ZZ-0006(Q) Hot Standby to Cold Shutdown
- S2.OP-SO.MS-0002(Q) Steam Dump System Operation
- S2.OP-TM.ZZ-0001(Q) Reactor Coolant System Pressure - Temperature Curves
- SC.OP-DL.ZZ-0012(Q) Pressurizer Heatup/Cooldown Log
- SC.OP-DL.ZZ-0011(Q) Reactor Coolant System Heatup/Cooldown Log
- S-2-RC-MEE-1672 Engineering Evaluation of 2R12 Reactor Excessive Cooldown Event
- Notification 20095802 Tech Spec Cooldown of 100 degrees Exceeded

The inspectors noted that integrated operating procedure S2.OP-IO.ZZ-0006(Q) provides precautions and limitations to determine RCS temperature and pressure at least once per 30 minutes with a maximum cooldown rate of 100°F in any one hour. The inspectors observed that system operating procedure S2.OP-SO.MS-0002(Q) requires establishing a cooldown rate of less than 100°F per hour if an RCS cooldown is performed. The inspectors also noted that operating procedure SC.OP-DL.ZZ-0011(Q) requires that readings shall be placed on the Plant Computer Trend and monitored at least once every 30 minutes or plotted directly onto the log at least once every 30 minutes to verify compliance with TS and limits the cooldown rate to 100°F/Hr. The inspectors verified that the Plant Computer Trend of the RCS cooldown was filed with the control room logs as required by SC.OP-DL.ZZ-0011(Q). The inspectors observed that the graphical plot printed by plant computer does not provide curve limits similar to those provided in the TS, SC.OP-DL.ZZ-0011(Q) or S2.OP-TM.ZZ-0001(Q). The inspectors' review of engineering evaluation S-2-RC-MEE-1672 noted that RCS temperature change exceeded the 100°F limit between 0150 and 0219 hours and the maximum temperature drop in a one hour period was 127°F.

b. Findings

Except for a licensee identified violation documented in Report Section OA7, no findings of significance were identified.

R15 Operability Evaluations

.1 21 and 25 Containment Fan Cooler Unit Thermal Performance Testing

a. Inspection Scope

Notification 20094772 documented that thermal performance test results for the 21 and 25 containment fan cooling units (CFCUs) did not meet the single CFCU heat transfer rate acceptance criteria of 65.6 MBTU/Hr. Additionally, the aggregate of the three lowest CFCUs did not meet the heat transfer rate acceptance criteria of 196.8 MBTU/Hr. These acceptance criteria were based on design basis accident conditions which

includes a service water temperature of 90°F. The inspectors reviewed Operability Determination 02-003, "Unit 2 CFCUs Degraded Thermal Performance," that was documented in Order 70023626 (Operation 0010). An analysis was performed that found that the acceptance criteria of 196.8 MBTU/Hr. was met with a maximum service water temperature of 78°F. Based on this analysis, PSEG Nuclear determined that the CFCUs were degraded but operable up to a maximum service water temperature of 78°F. A compensatory measure (Operation 0030) was established to monitor river water temperature once per shift to verify that the CFCUs remained operable.

The inspectors also reviewed the follow-up assessment that engineering documented in Order 70023626 (Operation 0020). The follow-up assessment confirmed the operability determination regarding the maximum service water temperature of 78°F and noted that this temperature historically is not reached until June each year. The corrective actions identified included cleaning at least the 21 and 25 CFCUs during the 2R12 refueling outage and retesting the thermal performance capability of the CFCUs.

b. Findings

No findings of significance were identified.

.2 16 Service Water Pump Packing Failure

a. Inspection Scope

The inspectors reviewed the engineering input document and operability determination (OD) 02-004 which described PSEG Nuclear's basis for considering all station SW pumps operable subsequent to discovery of an improperly machined lantern ring on the 16 SW pump. The remaining SW pumps were considered susceptible to this potential problem that could result in excessive pump leakage and the introduction of loose parts into the SW pump and/or system. The OD indicated that the pump packing leakage would be expected to increase prior to failure of the lantern ring. The inspectors confirmed that PSEG Nuclear had implemented a program to monitor the SW pump packing leakage and also performed several walkdowns during the period to confirm that the SW pump packing leakage was bounded by the assumptions stated in OD 02-004.

b. Findings

No findings of significance were identified.

R19 Post Maintenance Testing

a. Inspection Scope

The inspectors observed the performance of post-maintenance testing and/or reviewed documentation for selected risk-significant systems to assess whether the systems would satisfy TSs, Updated Final Safety Analysis Report and PSEG Nuclear procedural requirements. The inspectors assessed whether the testing appropriately demonstrated that the systems were operationally ready and capable of performing their intended safety functions. The inspectors reviewed the 2A and 2C EDG test runs following

completion of their maintenance overhauls and also reviewed performance of the 11 SW pump following maintenance to correct a low discharge pressure condition.

b. Findings

No findings of significance were identified.

R20 Refueling and Outage Activities

a. Inspection Scope

The inspectors reviewed selected activities prior to and during the 2R12 refueling outage to confirm that PSEG Nuclear appropriately considered risk in the scheduling and implementation of 2R12 and to ensure that license and TS requirements were met. Additionally, the inspectors reviewed evolutions that could impact the performance of safety-related equipment and verified that corrective actions for identified deficiencies were appropriate. Some of the activities reviewed included:

- Reviewed the plant cooldown data to determine whether the plant cooldown was performed in accordance with TS limits. A licensee identified violation for exceeding the TS cooldown limits is described in R14.

- Periodically verified that the plant was maintained in a configuration consistent with the plant Outage Risk Assessment and Management (ORAM) plan. Independently verified that decay heat removal systems were available as required.

- Reviewed reduced inventory and mid-loop conditions. Reviewed contingency plan for inventory control for RCS at mid-loop with fuel in the reactor vessel and Salem Operations Manager supervisory letter, SOD-2002-027, “Mid-Loop Operations and Vacuum Fill Activity,” with mid-loop preparations. Verified that a temporary level column was installed and could be remotely monitored to determine the water level in the RCS hot leg and the reactor pressure vessel. Reviewed preparations for steam generator nozzle dam removal including mock-up training. Verified that the containment equipment hatch was secured during reduced inventory operations and that the personnel equipment hatch could be promptly secured.

- Reviewed fuel handling operations including removal and insertion of the fuel bundles and fuel movement within the spent fuel pool. Noted that the integrity of fuel bundle spring bolting for bundles to remain in the core was verified during fuel handling. Verified that fuel handling was performed in accordance with plant procedures and that the location of fuel assemblies, including new fuel assemblies, and control elements were tracked from core offload through core reload.

- Reviewed and/or observed selected maintenance activities including: 2A and 2C EDG outages, 21 and 22 SW header outages and internal pipe inspection results, and 22 containment spray pump full flow testing and restoration.

- Walked down the containment and pressurizer cubicle during closeout activities and prior to reactor startup to identify debris that could affect the performance of the containment emergency sump. Minor lists of debris identified during the containment walkdowns were provided to PSEG Nuclear personnel for removal and resolution.

b. Findings

No findings of significance were identified.

R22 Surveillance Testing

a. Inspection Scope

The inspectors observed the performance of surveillance test procedures or reviewed test data of selected risk-significant SSCs to assess whether the SSCs satisfied the Technical Specifications, the Updated Final Safety Analysis Report, and PSEG Nuclear procedure requirements. The inspectors assessed whether the testing appropriately demonstrated that the SSCs were operationally ready and capable of performing their intended safety functions. The following tests and activities were reviewed:

- S2.OP-ST.SW-0001(Q), "Inservice Testing - 21 Service Water Pump"
- S2.RA-IS.ZZ-0002(Q), "Type B & C Leak Rate Test" - (Penetration 23: Containment Control Air Header 22)
- S2.OP-ST.CS-0005(Q), "22 Containment Spray Full Flow Testing"
- S2.OP-ST.SSP-0002(Q), "SEC Mode Ops Testing - 2A Vital Bus"

An inspector observation regarding the review and acceptance of the 2A emergency diesel generator loading results for S2.OP-ST.SSP-0002(Q) was documented in Notification 20101331 for disposition by the corrective action process.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Occupation Radiation Safety [OS]

OS1 Access Control

a. Inspection Scope

The inspector reviewed exposure significant work areas, high radiation areas, and airborne radioactivity areas in the plant and evaluated associated controls and surveys of these areas to determine if the controls (i.e., surveys, postings, barricades) were acceptable. For these areas, the inspector reviewed radiological job requirements and attended job briefings to determine if radiological conditions in the work area were adequately communicated to workers through briefings and postings. The inspector also verified radiological controls, radiological job coverage, and contamination controls to ensure the accuracy of surveys and applicable posting and barricade requirements.

The inspector determined if prescribed radiation work permits (RWPs), procedure and engineering controls were in place; whether surveys and postings were complete and accurate; and if air samplers were properly located. The inspector reviewed RWPs used to access these and other high radiation areas to identify the acceptability of work control instructions or control barriers specified. The inspector reviewed electronic pocket dosimeter alarm set points (both integrated dose and dose rate) for conformity with survey indications and plant policy, and reviewed portions of the training and qualifications program for radiation workers to ensure that their performance was consistent with their training and qualifications with respect to the radiological hazards and work activities. The controls implemented by PSEG Nuclear were compared to those required under TS 6.12 and 10 CFR 20, Subpart G for control of access to high and locked high radiation areas.

The primary focus during this inspection was work in support of the Unit 2 refueling outage (2R12). Outage activities observed included: reactor maintenance including core barrel lift; eddy current testing in all four steam generators; replacement of the 23 reactor coolant pump motor; in-service inspection including local leak rate testing; in-vessel visual inspection; and split pin work.

The inspector also reviewed PSEG Nuclear notifications documenting access control issues related to the Unit 2 outage. These notifications were: 20096150; 20096173; 20096191; 20096251; 20097066; and, 20097167.

b. Findings

No findings of significance were identified.

OS2 ALARA Planning and Controls

a. Inspection Scope

The inspector reviewed work to be performed during the Unit 2 refueling outage (2R12). Areas included a review of the use of low dose waiting areas, a review of on-job supervision provided to workers, and a review of individual exposures from selected work groups. An evaluation of engineering controls utilized to achieve dose reductions, analysis of PSEG Nuclear source term reduction plans, and the bases for PSEG Nuclear's outage goal of not more than 125 person-rem were also conducted. Through the first two weeks of the outage, total exposures were tracking within 5% of the outage goal.

The inspector observed radiation worker and radiation protection (RP) technician performance during high dose rate or high exposure jobs to determine if workers demonstrated proper techniques to maintain occupational exposures as low as is reasonably achievable (ALARA) and if their training/skill level was sufficient with respect to the radiological hazards and the work involved. The jobs observed are listed in Section 2OS1 above, and include reactor maintenance (24.638 rem goal); eddy current testing in the steam generators (9.243 rem goal); reactor coolant pump and motor work (2.003 rem goal); in-service inspection (14.000 rem goal); and, split pin work (9.000 rem goal).

The inspector reviewed ALARA job evaluations, exposure estimates, and exposure mitigation requirements and compared ALARA plans with the results achieved. A review was conducted of the integration of ALARA requirements into work procedures and RWP documents, the accuracy of person-hour estimates and person-hour tracking, and generated shielding requests and their effectiveness in dose rate reduction.

A review of actual exposure results versus initial exposure estimates for current work was conducted including: comparison of estimated and actual dose rates and person-hours expended; determination of the accuracy of estimations to actual results; and determination of the level of exposure tracking detail, exposure report timeliness and exposure report distribution to support control of collective exposures to determine conformance with the requirements contained in 10 CFR 20.1101(b).

b. Findings

No findings of significance were identified.

OS3 Radiation Monitoring Instrumentation

a. Inspection Scope

The inspector reviewed field instrumentation utilized by RP technicians and plant workers to measure radioactivity, including portable field survey instruments, friskers, portal monitors and small article monitors. The inspector conducted a review of selected radiation protection instruments observed in the radiologically controlled area (RCA),
specifically verification of proper function and certification of appropriate source checks for these instruments which were utilized to ensure that occupational exposures are maintained in accordance with 10 CFR 20.1201.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES [OA]

OA1 Performance Indicator (PI) Verification

a. Inspection Scope

The inspector reviewed PSEG Nuclear's data for Unplanned Power Changes per 7000 Critical Hours at Unit 1 for the past year. The inspector reviewed frequently asked questions (FAQ) that were submitted in response to a downpower at Unit 1 on September 24, 2001, and in response to downpowers on February 26 and February 28, 2002. The PIs for these events will be updated, if required, following resolution of the FAQs. Salem Unit 1 crossed into the threshold from green to white performance measurement during the 1st quarter of 2002.

b. Findings

No findings of significance were identified.

OA2 Identification and Resolution of Problems

a. Inspection Scope

NRC inspection report documented the inspectors' review of PSEG Nuclear's response to a December 31, 2001, event involving the failure of the pressurizer spray valve (PS-3). The inspectors concluded that the operating procedures did not provide adequate guidance to operators during their response to a stuck open pressurizer spray valve event that resulted in an automatic reactor trip and safety injection. The instructions which existed regarding the valve, including stopping reactor coolant pumps and isolating control air, conflicted with actions needed to address the event. However, PSEG Nuclear did not identify the procedural deficiencies during the post-trip review of the event as specified by the post-trip review procedure. Region I selected this event to review in more detail and to verify that actions taken by PSEG Nuclear, to evaluate this event and identify corrective actions, were commensurate with the safety significance of this event.

The inspectors reviewed the Notification 20087747, "Post Transient Review Process Deficiency," that placed this issue in the corrective action process and the subsequent significance level 2 apparent cause determination evaluation documented in Order 70022264, Operation 0010. The inspector reviewed this evaluation that identified the following four apparent causes and the associated corrective actions:

- Based on a review of SH.OP-AP.ZZ-0101(Q), "Post-Transient Response Requirements," and discussions with Salem TARP team leads, the evaluator determined that inadequate procedural guidance for the TARP teams was one apparent cause of the event. The corrective action was to revise SH.OP-AP.ZZ-0101(Q) to clearly define: requirements for responding to varying incidents; roles and responsibilities of responders; and, requirements for Station Operations Review Committee (SORC) presentations. The inspector reviewed the revised version of procedure SH.OP-AP.ZZ-0101(Q).

- Based on a review of the abnormal operating procedures (AOP) and emergency operating procedures (EOP) after the event, the evaluator determined that operator log keeping did not contain sufficent detail to readily re-create plant performance and operator response. The specified corrective action was to reinforce management expectations regarding log keeping during AOPs and EOPs implementation in accordance with SH.OP-AP.ZZ-102(Q), "Use of Procedures" during licensed operator requalification training. Inspector discussions with training personnel indicated that the log keeping training is ongoing.

- Based on a review of S2.OP-AB.PZR-0001(Q), "Pressurizer Pressure Malfunction" the evaluator determined that the AOP provided inadequate procedureal guidance for the operating shifts. The corrective action was to modify S1.OP-AB.PZR-0001(Q) and S2.OP-AB.PZR-0001(Q), to include appropriate guidance for RCP operation with a spray valve failure. The inspector reviewed the revised version of procedures S1\S2.OP-AB.PZR-0001(Q).

- Based on historical data and discussions with the operating crew, the evaluator determined that pressurizer pressure lowered faster that the crew expected.

Unavailability of all group 21 and 22 pressurizer heaters contributed to the rapid drop in pressure. Planned corrective actions specified included repairing the unavailable pressurizer heaters and raising the priority of unavailable heaters in SH.OP-AP.ZZ-108(Q), "Operability Assessment and Equipment Control Program."

The inspectors also reviewed the Notification 20087714, "2PS3 Failed Open Resulting in a Reactor Trip," and the subsequent significance level 1 root cause determination evaluation documented in Order 70022203, Operation 0010. The inspectors reviewed this evaluation that identified five root causes, 13 contributing causes and the associated corrective actions. The inspectors noted that the majority of the causes related to design and maintenance issues associated with the pressurizer spray valves, the valve positioner and positioner feedback linkage. Human performance errors associated with missed opportunities for prior identification and the review of operating experience were also identified. The inspectors selected the following causes and corrective actions for detailed review:

- Based on discussions with senior reactor operators, the evaluator determined that generic guidance and Salem-specific EOPs did not provide adequate guidance for an open uncontrollable pressurizer spray valve. The planned corrective actions include engaging Westinghouse to review the generic AOP and EOP guidance, revising to the EOPs, providing training on the revised procedures, and providing simulator scenarios on similar events during license operator requalification training.

b. Findings

No findings of significance were identified.

OA3 Event Follow-up

.1 (Closed) LER 272/02-001-00: Non-conservative Steam Generator Low-Low Level Setpoint. This LER described an issue involving a non-conservative bias associated with the steam generator narrow range water level instruments. This issue was discussed in NRC Inspection Report 02-03. No new information was identified and this LER is closed.

OA5 Other

.1 TI 2515/145 - Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles

a. Inspection Scope

The inspector reviewed PSEG Nuclear's inspection activities to detect evidence of leakage and/or cracking of RPV head penetration (control rod drive mechanism and the vessel head vent) nozzles in response to NRC Bulletin 2001-01 as required by TI 2515/145. PSEG Nuclear performed a visual examination to evaluate the integrity of the vessel head penetrations to confirm the absence of flaws and boric acid deposits at the penetration to head interface or in close proximity to that location.

The inspection included interviews with program management, examination personnel, and metallurgical engineers to assess their knowledge of these activities. The inspector reviewed the examiners' qualification records to verify PSEG Nuclear's training and qualification processes adequately prepared the assigned staff to perform the examination. Also, the inspector reviewed the examination procedures to determine whether they provide adequate guidance and examination criteria to implement the examination plan.

The inspector selected samples of control rod drive mechanism (CRDM) penetrations and the vessel head vent penetration to observe and evaluate the effectiveness of the visual examination and ensure that the examination could reliably detect any leakage from a failure in the vessel head penetration nozzles. The inspector verified by observation that the reactor vessel head was free of dirt, debris, insulation, significant oxidation and any items that could adversely affect viewing of the penetrations (360 degrees around the circumference of the nozzle) and the vessel head in its entirety. The inspector verified that the procedures used provided that anomalies, deficiencies and discrepancies identified during the examination process were evaluated for relevance and the results documented and recorded.

b. Findings

No findings of significance were identified.

The following documents the specific reporting requirements of TI 2515/145:

Reporting Requirements of TI 2515/145 - Circumferential Cracking of RPV Head Penetration Nozzles Reporting Requirements

a.1. The examination was performed by qualified and knowledgeable personnel with certification to the ASME, Section XI, Level II and Level III for visual examiners. Also, inspectors and support personnel received a pre-job briefing conducted by the Level II examiner covering the removal of insulation and performance of the visual inspection. In addition, personnel had documented training in the recognition of unacceptable boron deposits as found at other plants.

a.2. The examination was performed using adequate procedures. The procedures specified the extent of the inspections required, provided detailed documentation requirements and provided clear inspection standards and acceptance criteria on which personnel were trained. The examination procedure was approved by the licensee's Manager of Engineering Programs.

a.3. The examination was adequate to identify, resolve, and disposition deficiencies.

a.4. The examination performed was capable of identifying the primary water stress corrosion phenomena described in the bulletin.

b. The reactor vessel head was free of dirt, debris, insulation, significant oxidation and any items that could adversely affect viewing of the penetrations (360 degrees around the circumference of the nozzle) and the vessel head in its entirety. There are no viewing obstructions.

c. Small boron deposits, as described in Bulletin 2001-01, could be identified and characterized by the visual technique used. No boron deposits of any quantity were identified at the penetrations or on adjacent areas of the vessel head.

d. No material deficiencies were identified.

e. The ALARA radiation exposure controls were effective in minimizing personnel exposure during the insulation removal and visual examination of the penetrations and the vessel head. The examination was accomplished from the top of the vessel head flange. Also, a significant effort was made to reduce exposure to personnel involved in activities in close proximity to the vessel head. The CRDM cooling shroud and the mirror insulation were both easily removed from the location to be inspected. There were no significant items which would impede an effective examination of the outside surface of the head and penetrations in the future. There was no significant challenge to radiation exposure controls.

OA6 Management Meetings

1. Exit Meeting Summary

On May 29, 2002, the inspectors presented their overall findings to members of PSEG Nuclear management led by Mr. L. Waldinger of Salem Operations. PSEG Nuclear management stated that none of the information reviewed by the inspectors was considered proprietary.

2. PSEG Nuclear/NRC Management Meeting

On April 3 senior PSEG Nuclear management including Mr. H. Keiser, Mr. D. Garchow and Mr. T. O'Connor met with NRC Region I management including Mr. H. Miller and Mr. R. Blough in the Region I office to discuss recent plant performance trends and improvement initiatives.

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

NCV 50-272; 311/2002-04-01: Technical Specification 6.8.1.a requires that written procedures be established, implemented and maintained covering the applicable procedures recommended by Appendix "A" of Regulatory Guide (RG) 1.33, Revision 2, February 1978. RG 1.33 requires general plant operating procedures for hot standby to cold shutdown. Salem operations procedure S2.OP-IO.ZZ-0006(Q), "Hot Standby to Cold Shutdown," step 3.6.3 provides precautions and limitations to determine RCS temperature and pressure at least once per 30 minutes with a maximum cooldown rate of 100°F in any one hour. Contrary to the above, PSEG Nuclear inadequately implemented S2.OP-IO.ZZ-0006(Q) and inadequately determined that RCS temperature was within limits with a maximum cooldown of 100°F in any one hour period when the RCS temperature change exceeded the 100°F limit between 0150 and 0219 hours with a maximum temperature drop of 127°F in a one hour period. This issue was placed into PSEG Nuclear's corrective action program as Notification 20095802.

If you deny this non-cited violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at the Salem facility.

ATTACHMENT 1
SUPPLEMENTAL INFORMATION

a. Key Points of Contact

C. Conner, NDE Engineer
K. Davison, Salem Operations Manager
C. Fricker, Salem Operations Manager
P. Fabian, Steam Generator Engineer
A. Fakar, Engineering Program Manager
M. Hassler, Radiation Protection Operations Superintendent - Salem
D. Hughes, Project Engineer Manager Technical Support
J. Moaba, Project Manager Steam Generator
J. Nagle, Supervisor Licensing
T. Neufang, ALARA Supervisor - Salem
K. O'Hare, Radiation Protection Manager (Acting)
M. Oliverie, ISI Engineer
A. Roberts, Supervisor Code Compliance and Welding Engineering
B. Thomas, PSEG Licensing Engineer
W. Treston, Supervisor ISI
V. Zabielski, Steam Generator Supervisor
A. Kapsalopoulsu, State of New Jersey, Research Scientist Department of Environmental Protection

b. List of Items Opened, Closed, and Discussed

Discussed

50-272/2001-07-01	URI	ASME Code compliance of Unit 1 Refueling Water Storage Tank. (Section R8)

Opened/Closed

50-272/02-001-00	LER	Non-conservative steam generator low-low level setpoint. (Section OA3)
50-272;311/2002-04-01	NCV	Inadequate implementation of procedures controlling RCS cooldown rate. (Section OA7)

c. List of Documents Reviewed

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records:

- NRC Bulletin 2001-01, Circumferential Cracking of Reactor Head Penetration Nozzles
- PSEG Nuclear Response to Bulletin 2001-01

- NRC Bulletin 2002-01, Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity
- 02RF Examination Summary Record
- SC.RA-IS.RC-0001-1 RPV Closure Head Penetration Examination Data Sheet
- SC.RA-IS.RC-0001-2 RPV Closure Head Penetration Checklist Report Sheet
- SC.RA-IS.RC-0001(Q), Rev. 0, Vessel Head Penetration Examination
- E234-448-7, Closure Head Assembly
- E234-458-2, Closure Head Insulation Assembly and Details
- E234-452-6, Control Rod Penetration Details
- E234-451-4, Control Rod Mechanism Housing Details
- Inspectors Qualification Test Records, NDE Certificates of Qualification, Vision Tests and Proficiency Reports
- CRDM Reactor Head Contingencies Plan for Indication Disposition
- "Salem 2R11 Steam Generator Operational Assessment for Cycle 12" Engineering Evaluation S-2-RC-MEE-1469 Rev. 0, 2-27-2001
- “Steam Generator Degradation Assessment” Salem Unit 2 Refueling Outage 12 (2R12), April 2002, Rev 0
- "Steam Generator Program" SC.SA-AP.ZZ-0042(Q),
- "Condition Monitoring and Operational Assessment of Steam Generator Tubing at Salem Unit 2, 2R10"
- Order 60019962 OPACT 0020; Drain and repair the RWST during the next outage
- Order 60025670; ASME Code Repair of 2-SW-P-6152, leaking service water header flange face and fillet weld
- Order 30033998; ASME Code Repair of Nuclear Header underground piping and joints from 24SW5 wall flange up to 22SW22 to include 24” EDG supply header
- Order 70017741 OPACT 0040; Acceptance Criteria for leakage from Salem Unit 1 RWST Drain down and Cold Leg Recirculation

d. List of Acronyms

ALARA	As Low As Is Reasonably Achievable
AOP	Abnormal Operating Procedures

ASME	American Society of Mechanical Engineer
CFCUs	Containment Fan Cooling Units
CFR	Code of Federal Regulations
CRDM	Control Rod Drive Mechanism
DBT	Design Basis Threat
EDGs	Emergency Diesel Generators
EOP	Emergency Operating Procedures
FAQ	Frequently Asked Questions
NCV	Non Cited Violation
NRC	Nuclear Regulatory Commission
OD	Operability Determination
ORAM	Outage Risk Assessment and Management
PARS	Publicly Available Records
PI	Performance Indicator
PSEG	Public Service Electric Gas
PORV	Power Operated Relief Valve
RCA	Radiologically Controlled Area
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RP	Radiation Protection
RPV	Reactor Pressure Vessel
RWP	Radiation Work Permit
RWST	Reactor Water Storage Tank
SDP	Significance Determination Process
SORC	Station Operations Review Committee
SW	Service Water
TARP	Transient Assessment Response Plan
TI	Temporary Instruction
TS	Technical Specifications
TSAS	Technical Specification Action Statement
URI	Unresolved Item