U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos.	50-272/95-19 50-311/95-19
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:	October 15, 1995 - November 18, 1995
Inspectors:	C. S. Marschall, Senior Resident Inspector J. G. Schoppy, Resident Inspector T. H. Fish, Resident Inspector J. D. Noggle, Senior Radiation Specialist
Approved:	Larry E. Nicholson, Chief Projects Branch 3 — Date 12/13/95

Inspection Summary:

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

EXECUTIVE SUMMARY

Salem Inspection Reports 50-272/95-19; 50-311/95-19

October 15, 1995 - November 18, 1995

OPERATIONS (Module 71707) The inspectors concluded that control operators appropriately confirmed the validity of the Salem Unit 2 Fuel Handling Ventilation (FHV) low differential pressure alarm. Although senior operators initially did not adequately challenge the engineers to resolve the implications of the FHV low differential pressure alarm, in response to the inspectors questions, operations managers challenged engineering and initiated measures to insure FHV remained operable during fuel handling activities.

The inspectors determined poor planning led to untimely implementation of the winterization plan, to a potential adverse impact on Unit 1 spent fuel pool cooling, and to unnecessarily extending the outage of an off-site power source. Planning personnel aggressively attacked these issues and improved planning performance. Improvements included an increased focus on pre-job planning, schedule adherence, contingency planning and shutdown risk assessment. Improved planning and schedule adherence resulted in a net safety gain due to reduced equipment outage time and risk-managed outage windows.

At times, control room operators and shift supervisors remained informed and protective of key plant equipment required to perform safety functions. Operations demonstrated good risk perspective in challenging the planning process to minimize conditions that resulted in the station having an emergency diesel unavailable concurrent with a single source of off-site power. Operations management initiated and successfully conducted contingency plan drills for Unit 2 loss of shutdown cooling and Unit 1 loss of normal diesel fuel oil transfer capability.

Poor communication and control resulted in an undesired service water pressure switch isolation, and operation of a positive displacement charging pump at low speed with the reactor coolant system depressurized. Although the miscommunications resulted in no safety consequence, operators failed to effectively control and maintain plant equipment.

At other times, operators did not effectively control plant activities. The inspectors noted several examples of poor work control that resulted in maintenance supervisors receiving authorization to begin work before operators established adequate tagging. The inspectors also noted that because the maintenance supervisors appropriately verified their tagouts, they detected the deficient tagging conditions, and thus prevented possible injury to maintenance personnel.

MAINTENANCE/SURVEILLANCE (Modules 61726, 62703) The NRC identified that technicians did not effectively use a spent fuel pit pump coupling alignment procedure. On another occasion, maintenance technicians strictly controlled and precisely documented emergency diesel generator service water check valve maintenance. Over the period, maintenance showed continuing improvement in attention to detail, interface with operations, supervisor oversight, and procedure usage.

Mechanical maintenance personnel did not practice adequate foreign material exclusion when working on main steam isolation valve (MSIV) hydraulic actuators, as demonstrated by the debris maintenance personnel discovered in the no. 13 MSIV actuator hydraulic oil reservoir. Maintenance staff had a reasonable explanation for how the debris intrusion occurred. They appropriately inspected all MSIV actuator reservoirs and, based on the inspection results, scheduled the reservoirs to be drained and flushed.

Salem staff attempts to correct tagging problems have not been effective as demonstrated by operators tagging the wrong component during a switchyard evolution. The inspectors concluded that operators did not follow procedure requirements; however, this is not a cited violation due to previous enforcement action taken for the same problem, and PSE&G commitment to maintain both units shutdown to address such long-standing issues prior to restart.

ENGINEERING (Module 37551) System engineers appropriately translated a concern with bolt wastage in the no. 11 Component Cooling Heat Exchanger (CCHX) to an operability question for the no. 21 CCHX and no. 22 CCHX. Based on inspection results of nos. 21 and 22 CCHXs, engineers appropriately determined Unit 2 CCHXs operable.

PLANT SUPPORT (Module 71707) The NRC observed several poor radiological worker practices. In addition, the licensee attributed a number of recent radiologically occurrence reports (RORs) to personnel errors and poor practices. These practices resulted in no significant radiation exposure or personal contamination to involved individuals. Radiation Protection (RP) supervisors and technicians responded promptly and appropriately to address these issues. Managers discussed this recent trend in poor radiological worker practices in a daily management meeting and indicated that a more programmatic concern existed. Radiation Protection management provided timely, well-documented ROR root cause trending and tracking.

An announced inspection of the solid radwaste/transportation program was conducted by Mr. J. Noggle at the Salem Nuclear Generating Station on October 23 - 27, 1995. Areas reviewed included management oversight, training, radwaste processing, radwaste sampling, radioactive material shipping, and onsite radwaste storage. The solid radwaste/transportation program was determined to be strong. A reduction in the independent surveillance of radioactive shipments was noted. The licensee reinstated the review of all reportable quantity shipments. No violations of regulatory requirements were identified.

Security force members (SFMs) did not pursue repair of degraded assessment aids in a timely manner. Security force acceptance of this condition represented a security force "work-around." SFMs adequately compensated for the degraded equipment. The inspectors determined the degraded assessment aids presented a potential challenge to SFM performance. Security management initiated work orders to correct the deficiencies.

SAFETY ASSESSMENT AND QUALITY VERIFICATION The Station Operations Review Committee (SORC) demonstrated a good questioning attitude and safety perspective involving several plant procedures and equipment modifications.

In response to a missing service water pressure switch and three mispositioned service water and fuel handling ventilation instrument valves, Salem managers appropriately determined that the process for insuring proper alignment of instrument valves did not effectively control or document valve position. Salem managers took appropriate action to verify instrument valve position for the missing pressure switch. In addition, they initiated action to improve labeling and procedures to control instrument valve alignments. System engineering managers found that system engineers identified the missing pressure switch in August 1995 and did not appropriately document it or otherwise communicate it to the operators. The system engineering managers reasonably attributed the omission to personnel error, and responded appropriately.

As a result of the lack of discussion or preparation for a coastal storm on November 14, inspectors concluded that Salem management did not have an effective means to insure personnel initiated site-wide preparations for severe weather.

TABLE OF CONTENTS

DETAILS

1.0 OPERATIONS

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's 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 35 hours of deep back-shift inspections.

1.1 Summary of Operations

Unit 1 remained defueled for the duration of the inspection period.

Unit 2 operators maintained Unit 2 in mode 5 (Cold Shutdown) for the duration of the period.

1.2 Fuel Handling Ventilation (FHV) Operability

On October 31, Salem staff discovered that the low differential pressure (dp) alarm switch for Unit 2 FHV did not function properly. The basis for Technical Specification 3.9.12 states that operation of FHV ensures mitigation of fuel handling accidents, as discussed in the UFSAR accident analysis. The action statement for TS 3.9.12 states that with FHV inoperable, stop all activities in the fuel handling building involving fuel movement or movement of loads over the spent fuel pool. The surveillance requirements of TS 4.9.12 require operators to demonstrate the FHV capability to develop an air pressure drop of 0.125 inches water gauge below atmospheric pressure.

After implementation of a design change package, operators received numerous FHV low differential pressure alarms. Plant staff determined that personnel simultaneously opening the inner and outer doors between the fuel handling building and the auxiliary building, and gusts of wind from the northwest appeared to cause the low dp alarms. Engineering staff verified that FHV continued to function properly. Other members of the plant staff prepared to resume spent fuel pool re-racking activities.

The inspectors noted that the nuclear control operators had confirmed that the FHV low differential pressure alarm functioned properly. An engineering memo that evaluated the FHV ability to meet it's design function stated that the FHV system remained operable under short duration, spurious alarm conditions. The memo further stated that they had not determined the cause of the spurious alarms. Based on available information, the inspectors could not determine if the alarms reflected an inoperable FHV system. The inspectors also noted that the senior operators had not challenged the unsupported engineering conclusion that FHV remained operable. Operations managers reviewed the engineering memo, met with engineering to discuss the cause of the alarms, and concluded that the facts did not support FHV operability for alarm conditions.

In response, engineers provided instrumentation to measure the actual differential pressure between the surface of the spent fuel pool (as opposed to the instrument rack) and atmospheric pressure. Engineers initiated efforts to relocate the external sensor point for atmospheric pressure to reduce its susceptibility to wind gusting. The operations manager requested that engineering initiate a procedure to provide control of the doors between the fuel handling building and the auxiliary building to insure that plant personnel opened no more than one door at a time during re-racking activities.

The inspectors concluded that nuclear control operators appropriately confirmed the validity of the Salem Unit 2 Fuel Handling Ventilation low differential pressure alarm. Although senior operators initially did not adequately challenge the engineers to resolve the implications of the FHV low differential pressure alarm, in response to the inspectors questions, operations managers challenged engineering and initiated measures to insure FHV remained operable during fuel handling activities.

1.3 Planning Performance

The inspector noted several planning shortcomings, however, the Planning Department and Salem station in general, continued to aggressively attack these issues and improve planning performance. Planning shortcomings included failure to timely implement the winterization plan, potential adverse impact on spent fuel pool cooling, and extended offsite power source outage duration. The inspector observed an increased focus on pre-job planning, schedule adherence, contingency planning, and shutdown risk assessment. The inspector noted, however, that improved planning and schedule adherence during the inspection period resulted in a net safety gain due to reduced equipment outage time and risk-managed outage windows.

Salem organization failed to properly plan cold weather protective measures. Approximately 80 man-months of winterization work disappeared from the planning schedule from May 1995 to October 1995. Consequently, maintenance and Engineering hastily implemented procedures and initiated design changes in a last-minute attempt to fulfill this need.

On November 5, 1995, Planning scheduled component cooling water (CCW) valve maintenance that required isolation of the one available source of component cooling to the spent fuel pool (SFP) heat exchanger. Fortunately, the nuclear shift supervisor recognized the impact on SFP cooling and did not authorize the scheduled maintenance. On November 7, 1995, operations tagged no. 14 station power transformer (SPT) and placed Unit 1 in a single source of offsite power condition. Lack of a focused maintenance plan resulted in a 24 hour delay prior to no. 14 SPT work commencement.

Management placed increased emphasis on proper planning, schedule adherence, and shutdown risk minimization. The inspector noted improved communication and coordination between operations, maintenance, engineering and planning. Mechanical maintenance, in particular, regularly achieved 100% schedule adherence.

1.4 Communication and Control

The inspector observed several examples of poor operations communication and control. Although the miscommunications resulted in no safety consequence, operators failed to effectively control and maintain plant equipment. Operations wrote condition reports to evaluate the occurrences relative to equipment and personnel performance.

On October 23, 1995, operations found no. 12 service water pump low flow differential pressure (d/p) switch isolated. This d/p switch affected the no. 12 service water pump auto-start feature on low service water header pressure. The Senior Nuclear Shift Supervisor decided to maintain the switch isolated. On October 25, operations attempted to unisolate the pressure switch. On November 3, operations found the pressure switch isolated again. Operations discovered that on October 24, another operating shift unisolated the pressure switch. On October 25, the equipment operator actually isolated the switch again vice unisolating it as operations desired.

On November 4, 1995, operations secured the no. 23 charging pump following the report of "banging noises" when operations placed the pump in service. The Maintenance Supervisor advised the operating shift that the pump should <u>not</u> be operated at low speed with the reactor coolant system depressurized. Operations maintained the pump "available", but not "operable." Contrary to the above direction, on November 6, the operating shift proceeded to perform a "break-in" run on the pump and placed the pump in service at low speed. A work control center (WCC) Nuclear Shift Supervisor (NSS), upon hearing of the "break-in" run, proceeded to the pump. The WCC NSS heard a loud banging noise at the pump and requested the shift remove the pump from service. Maintenance found no obvious pump damage. Operations requested that engineering fully evaluate potential pump damage and provide limiting operating parameters.

1.5 Work Control

The inspectors noted several examples of poor work control that resulted in maintenance supervisors receiving authorization to begin work before operators established adequate tagging.

On October 24, a work control supervisor issued a work order for electrical maintenance personnel to repair a ventilation damper. Subsequently, when the electrical maintenance job supervisor attempted to verify tagging boundaries for the repair he discovered that operators had not yet hung any tags for the job. He reported the discrepancy to the work control supervisor, who subsequently rescheduled the repair.

Similarly, on November 1, a mechanical maintenance supervisor received a work order to inspect the fan belts of a ventilation exhaust fan. When he went to the work control center to verify tagging boundaries he learned that the fan was still in service. The job supervisor informed the work control center supervisor that the tagout was inadequate, and postponed the inspection.

The inspectors concluded these examples highlighted weaknesses in the work control process. In the example of the damper repair, the work control supervisor performed an inadequate review of the scheduling and tagging information available on the work order. Regarding the fan belt inspection, operators had installed an alternate power supply jumper for the fan without performing an adequate review of related tagging requests and work orders. The inspectors also noted that because maintenance supervisors appropriately verified their tagouts, they detected the deficient tagging conditions, and thus prevented possible injury to maintenance personnel.

1.6 Safety Focus

Control room operators and shift supervisors remained informed and protective of plant equipment required to perform key safety functions. Operations management demonstrated good risk perspective in challenging the planning process to minimize emergency diesel unavailability and single source of off-site power conditions. Operations management initiated and successfully conducted contingency plan drills for Unit 2 loss of shutdown cooling and Unit 1 loss of normal diesel fuel oil transfer capability.

2.0 MAINTENANCE AND SURVEILLANCE

2.1 Maintenance

The inspectors observed portions of the following safety-related maintenance to learn if the licensee conducted the activities in accordance with approved procedures, Technical Specifications, and appropriate industrial codes and standards.

The inspector observed portions of the following activities:

Unit	Work Order(WO) or Design Change Package (DCP)	Description
Salem 1	WO 940811077	Piping replacement for service water intake bay no. 3.
Salem 1	WO 951027199	Component cooling spent fuel pit heat exchanger inlet gate valve packing adjustment.
Salem 1	DCP 1EC3321	1A EDG intake and exhaust modifications
Salem 1	WO 950305124	1A EDG lube oil pump repair
Salem 1	WO 951105007	1A vital bus breaker cubicle maintenance
Salem 2	DCP 2EC-3224	Unit 2 spent fuel pool re-rack.

The inspectors observed that the plant staff performed the maintenance effectively within the requirements of the station maintenance program.

2.2 Control of Maintenance

The inspector observed mixed performance in the control of maintenance. The inspector determined that technicians did not effectively use a spent fuel pit (SFP) pump coupling alignment procedure. On another occasion, maintenance technicians strictly controlled and precisely documented emergency diesel generator service water check valve maintenance. Over the period, the inspector noted an overall improvement in attention to detail, interface with operations, supervisor oversight, and procedure usage.

On October 18, 1995, the inspector observed technicians preparing to perform a coupling alignment on no. 21 SFP pump. Technicians did not use SC.MD-EU.ZZ-0002, *Coupling Alignment*, to control the activity though preparatory steps taken are detailed in the alignment procedure. The workers did not use the procedure to control the activity. Failure to implement the procedure is not a cited violation due to previous enforcement action taken for this same problem, and PSE&G commitment to maintain units shutdown to address such long-standing issues prior to restart. Following inspector questioning, maintenance supervisors conducted an objective self-assessment of this activity and determined that the technicians should have entered the coupling alignment procedure prior to commencing work. Maintenance management provided the technician the opportunity to relay lessons learned to the maintenance department.

On October 30, 1995, the inspector observed contractors engaged in emergency diesel generator service water check valve maintenance. The task involved three check valves and three separate work packages with each valve in a different state of repair. The inspector noted that the contractor pre-briefed the work, completed required perquisites, performed work activities as detailed in the work package and maintained the procedures up to date. Additionally, the contractor exhibited good knowledge of plant conditions, including potential impact of his work on plant safety status, and fully informed operations of his activities. The supervisor made frequent visits to the job site and provided close oversight of the maintenance.

2.3 Foreign Material Exclusion (FME)

Mechanical maintenance personnel did not practice adequate FME when working on main steam isolation valve (MSIV) hydraulic actuators, as demonstrated by the debris maintenance personnel discovered in the no. 13 MSIV actuator hydraulic oil reservoir.

On October 26, during vendor disassembly of the hydraulic actuator for the no. 13 MSIV, a mechanical maintenance supervisor noted a small piece of rolled up cardboard in the hydraulic actuator oil reservoir. The purpose of the actuator is to stroke the valve open and closed for test purposes; it does not close the MSIV in accident conditions. The supervisor immediately notified the mechanical maintenance supervisor of the debris.

The mechanical maintenance manager formed a team to determine how the foreign material intrusion occurred. The team reviewed all work since 1990 that involved the actuator and did not find anything significant that could explain the cardboard intrusion. The team believed a mechanic could have rolled the cardboard into a makeshift dipstick, and then stuck it into the reservoir fill hole to determine whether level was at or near full capacity. The mechanic then could have accidently dropped the tube into the oil reservoir, and not reported it.

Because of the debris in the no. 13 actuator, the manager initiated inspections of all other MSIV actuator reservoirs. These inspections yielded harmless results: maintenance personnel discovered a small piece of tape, a wood sliver, and minor amounts of sediment. Work requests - required to be completed before plant start up - were initiated to drain and flush the hydraulic system for all actuators. The manager also reviewed the matter with all maintenance personnel and reemphasized the importance of good FME practices.

The inspectors concluded that the maintenance staff had a reasonable explanation for how the debris intrusion occurred. The inspectors determined that maintenance personnel appropriately inspected all actuator reservoirs, and scheduled the reservoirs to be drained and flushed.

2.4 Tagging

Salem staff attempts to correct tagging problems have not been effective as demonstrated by operators tagging the wrong component during a switchyard evolution.

On November 3, operators on night shift closed and tagged the wrong 13 KV grounding switch. The correct switch was the ground for no. 14 station power transformer (SPT). Instead, an operator closed and tagged the grounding switch for bus section C-D. The alpha-numeric identifier of the ground switches differed by one character: 3J1YDBSC80 for no. 14 SPT ground switch vs. 3J1YDBSCD80 for the C-D bus ground switch. Since the C-D bus section was inside the tagging boundary (i.e., deenergized), no electrical transient occurred when the operator closed the wrong switch. The senior reactor operator supervising the evolution did not recognize the tagging error. The operator who performed the second verification also failed to recognize the error. On day shift, a mechanical maintenance supervisor walked down the tagout before his crew performed maintenance. He, too, failed to detect the error. Later, an electrical maintenance supervisor walked down the tagout in preparation for his work. He detected the error, and reported it to the senior nuclear shift supervisor (SNSS). The SNSS stopped work associated with the tagout, directed operators to re-verify the tagout, and reported the matter to the operations manager. The operations manager subsequently stopped all tagging activities, removed the operators involved from shift duties, and directed Maintenance and Operations staff to reemphasize the importance of self-checking, independent verification, and tagging safety. Operators resumed tagging on November 6.

Operations management reviewed the tagging event to determine what caused the error and concluded the operators did not follow procedures. Management based their conclusion on evidence that the operators and supervisors failed to adequately self-check their work and failed to correctly perform independent verification.

The inspectors independently reviewed the event and also concluded that the operators failed to follow procedures. The inspectors noted that both the tagging sequence and switchyard interlocks protected the operators from any electrical hazard; however they also determined the error was very serious because of the number of safety barriers that broke down. In the past, Salem management did not adequately address such breakdowns. In contrast, this time plant management clearly told the individuals involved that their performance did not meet expectations and that management would not tolerate additional lapses. The inspector noted operations management also formed a team to develop solutions for the tagging problems. The inspectors concluded operations management responded appropriately.

The inspectors have previously identified problems with Salem personnel not following procedures, and the NRC has taken escalated enforcement action against these problems. Also, Nuclear Business Unit management has kept both units shut down to address long-standing issues, including tagging, and will resolve the issues prior to re-start. Therefore, the NRC will not cite this as a violation.

2.5 Surveillance

The inspectors performed detailed technical procedure reviews, observed surveillances, and reviewed completed surveillance packages. The inspectors verified that plant staff did the surveillance tests in accordance with approved procedures, Technical Specifications and NRC regulations.

The inspector reviewed the following surveillances:

Unit	Procedure No.	Test
Salem 1	S1.OP-ST.DG-0017	1B Diesel Generator Overspeed Trip Test
Salem 2	S2.OP-PT.CUC-0002	Charging Pump Flow Test

The inspectors observed that plant staff did the surveillances safely, effectively proving operability of the associated systems.

3.0 ENGINEERING

3.1 Component Cooling Heat Exchangers

System engineers appropriately translated a concern with bolt wastage in no. 11 Component Cooling Heat Exchanger (CCHX) to an operability question for the no. 21 CCHX and no. 22 CCHX. Based on inspection results of nos. 21 and 22 CCHXs, engineers appropriately determined Unit 2 CCHXs operable.

On October 10, a condition report documented that the bolts for no. 11 CCHX had experienced wastage as a result of corrosion. The corrosion apparently resulted from water leaking around the gasket of the heat exchanger end bell. System engineers concluded that the wastage suffered by six bolts, in a population of approximately 70 bolts, did not affect heat exchanger operability. The system manager appropriately initiated a work request to inspect the bolts on the no. 21 CCHX and no. 22 CCHX. Engineers did not find evidence of bolt wastage.

As engineers evaluated the significance and extent of CCHX bolt wastage, the inspectors noted that management reviewed plant status and outage schedule at planning meetings; however, the plant staff did not discuss the status of work or degraded conditions affecting equipment important to decay heat removal, such as CCHX bolt wastage, for either of the Salem units.

4.0 PLANT SUPPORT

4.1 Radiological Work Practices

The inspector observed several poor radiological worker practices. In addition, the licensee attributed a number of recent radiologically occurrence reports (RORs) to personnel errors and poor practices. These practices resulted in no significant radiation exposure or personal contamination to involved individuals. Radiation Protection (RP) supervisors and technicians responded promptly and appropriately to address these issues. Managers discussed this recent trend in poor radiological worker practices in a daily management meeting and indicated that a more programmatic concern existed. The inspector noted that Radiation Protection management provided timely, well-documented ROR root cause trending and tracking.

On October 31, 1995, the inspector identified two separate instances of candy wrappers in contaminated trash bags in the RCA. Radiation Protection management provided additional guidance to plant personnel concerning the dangers of eating within the RCA.

On October 31, 1995, the inspector observed a contractor improperly removing anti-contamination clothing upon exiting a contaminated area. The contractor potentially contaminated the "step-off-pad." A Radiation Protection technician ensured that the technician and step-off-pad were clean. The RP technician provided additional training to the contractor concerning proper dress and undress procedures.

Radiation Protection noted recent problems in proper anti-contamination and undress, Radiation Work Permit (RWP) sign-on, and general attention to detail. Radiation Protection management placed increased emphasis on radiation worker knowledge, performance, and accountability. The inspector observed that RP action to address issues on an individual, case by case, basis only resulted in limited improvements to date.

4.2 Security

The inspector noted that security did not pursue repair of degraded assessment aids in a timely manner. One perimeter camera was completely "blacked out," one camera operated intermittently, another had a significantly degraded picture, and a fourth had a rolling picture. In addition, a number of cameras were extremely blurry at night. The inspector observed that security force members (SFM) properly compensated for the degraded equipment. The degraded assessment aids present an increased challenge to security force members and a potential performance detractor. Security force acceptance of this condition represents a security force "work-around." Security management initiated work orders to correct deficiencies.

5.0 SAFETY ASSESSMENT AND QUALITY VERIFICATION

5.1 Management Oversight

The Station Operations Review Committee (SORC) demonstrated a good questioning attitude and safety perspective involving several plant procedures and equipment modifications.

Engineering presented a request to allow a fuel handling building temperature range of 40 degrees F to 105 degrees F. SORC members questioned the engineering basis for the change and identified many unanswered questions concerning exhaust fan performance, boron precipitation and overhead crane nil-ductility temperature. SORC questioning demonstrated a good understanding and appreciation of technical specification and Final Safety Analysis Report (FSAR) requirements. Although it required three separate SORC meetings, SORC approved the request after engineering provided sufficient technical basis.

5.2 Service Water Pressure Switches

On October 20, operators learned of a missing pressure switch associated with the no. 26 service water (SW) pump. Salem designed the pressure switch to automatically start the no. 26 SW pump from a standby condition in response to low SW header pressure. Operators learned that technicians had identified the lack of the pressure switch in 1990.

Technicians also discovered an isolated Unit 2 fuel handling building (FHB) flow differential pressure (dp) switch. At the direction of the shift supervisors, equipment operators verified installation of the remaining eleven pressure switches. During the verification, an operator found the pressure switch for the automatic low pressure start of no. 12 SW pump isolated.

In response to the mis-positioned valves, operations and maintenance managers directed a verification of instrumentation associated with several systems for both Salem units. The systems included service water, component cooling water, emergency diesel generators, residual heat removal (Unit 2 only), and fuel handling building ventilation. In addition to the discrepancies described above, technicians found a pressure switch associated with the no. 22 SW pump traveling screens isolated. Due to the lack of an effective process to control and document alignments performed by Instrumentation and Controls technicians, and due to the poor labeling of the instrument valves, the Salem managers found that they could not determine when or how the valves had been mis-positioned. They concluded, however, that Salem staff had ineffective control of instrument valve alignments. The managers initiated action to improve labeling and procedure control of valve alignments.

The system engineers had identified the missing switch and verified existence of the remaining eleven pressure switches in August 1995. A system engineering manager determined that the engineers had not documented the missing pressure switch due to personnel error. The system engineering manager re-emphasized the expectation that system engineers document conditions adverse to quality in a Condition Report and inform control room operators in a timely manner.

The inspectors concluded that the Salem managers appropriately identified that the process for insuring proper alignment of instrument valves did not effectively control or document valve position. Salem managers took appropriate action to verify instrument valve position for the missing pressure switch. In addition, they initiated action to improve labeling and procedures to control instrument valve alignments. System engineering managers found that system engineers identified the missing pressure switch in August and did not appropriately document or otherwise communicate the discrepancy to operators. The system engineering managers reasonably attributed the omission to personnel error, and responded appropriately. Although the system engineers did not sure ineffective action, as required by procedure, the NRC will not take additional enforcement action in this instance, since ineffective corrective action has been identified in recent escalated enforcement action, the licensee voluntarily held the Salem units down for an extended period to correct equipment and process problems, and they plan to establish an effective corrective action process prior to restarting the Salem units.

5.3 Preparation for Severe Weather

On November 14, a coastal storm with winds predicted to reach 30 to 50 knots approached Salem. Weather forecasters also predicted coastal flooding and flooding in low-lying areas. The inspectors noted that the Salem staff did not plan to initiate procedures for preparing the site for the storm. Further, managers and supervisors did not discuss the approaching storm or the need to implement the site procedure for storm preparation at the morning meetings. In response to inspector questions, site managers initiated storm preparations. The inspectors noted that the site staff had not initiated

storm preparations on previous occasions until questioned by the inspectors. The inspectors concluded that Salem did not have an effective means to insure initiation of site-wide preparations for severe weather.

6.0 REVIEW OF REPORTS

The inspectors reviewed the following Licensee Event Reports (LERs) to determine whether the licensee took the corrective actions stated in the report, detect if the licensee responded to the events adequately, and ascertain if regulatory requirements and commitments were appropriately addressed:

Unit 1

Number	Event Date	Description
LER 95-021	April 3, 1993	Inoperability of both reactor vessel level indication system trains due to a single event.

The inspectors determined that the LER listed above does not warrant further inspection or enforcement action and considered the LER closed.

Unit 1

LER 95-15	July 11, 1995	Incomplete documentation of emergency diesel generator technical specification surveillance (see inspection report 95-13).
LER 95-16	July 20, 1995	Difference between containment design parameters and accident analysis (see inspection report 95-13).
LER 95-18	July 20 1995	Improper range gauges used for inservice testing (see inspection report 95-13).
LER 95-23	January 6, 1994	Failure to plug steam generator tubes due to missed eddy current indications (see inspection report 95-17).

The inspectors addressed NRC concerns and regulatory requirements in inspection reports as noted above.

7.0 EXIT INTERVIEWS/MEETINGS

7.1 Resident Exit Meeting

The inspectors met with Mr. C. Warren 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.

ATTACHMENT 1

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NOS. 50-272/95-19
50-311/95-19

LICENSEE: Public Service Electric and Gas Company

FACILITY: Salem Nuclear Generating Station, Units 1 and 2

INSPECTION AT: Hancocks Bridge, New Jersey

INSPECTION DATES: October 23-27, 1995

INSPECTOR: James Noggle — 11/14/95
James Noggle, Sr. Radiation Specialist — Date
Radiation Safety Branch
Division of Reactor Safety

APPROVED BY: John R. White — 11/14/95
John R. White, Chief — Date
Radiation Safety Branch
Division of Reactor Safety

DETAILS

1.0 INDIVIDUALS CONTACTED

1.1 Principal Licensee Employees

T. Cellmer, Radiation Protection Manager, Hope Creek
T. DiGuiseppi, Radiation Safety Manager, Services
R. Gary, Senior Radiation Protection Supervisor, Hope Creek
J. Gomeringer, Radiation Safety Specialist, Services
J. Kepley, Nuclear Quality Assurance Engineer
E. Lawrence, Quality Assurance Engineer, Salem
K. Maza, Chemistry/Health Physics/Radwaste Manager, Hope Creek
C. Munzenmaier, General Manager, Nuclear Operations Services
D. Parks, Radiation Protection/Chemistry Training Manager
R. Ritzman, Licensing Engineer, Hope Creek
J. Russell, Radiation Safety Specialist, Services
E. Villar, Licensing Engineer, Salem

1.2 NRC Employees

C. Marschall, Senior Resident Inspector, Salem
S. Morris, Resident Inspector, Hope Creek

The above individuals attended the inspection exit meeting on October 27, 1995.

The inspector also interviewed other individuals during the inspection.

2.0 PURPOSE OF INSPECTION

The purpose of this inspection was to review implementation of the solid radwaste/transportation program at the Salem Nuclear Generating Station.

3.0 AUDITS AND SURVEILLANCES

The inspector reviewed the licensee's program for auditing and providing independent surveillances of the solid radwaste/transportation program. The latest audit, No. 94-152, was performed on May 16 through June 1, 1994 (a Technical Specification biennial requirement). This audit was previously reviewed by the inspector during a previous inspection[1]. The previous inspection indicated that this audit was limited in technical depth and that there were no technical specialists included on the audit team due to scheduling conflicts.

---

[1] NRC Inspection Nos. 50-272/94-20; 50-311/94-20; 50-354/94-20 conducted on August 29 through September 2, 1994.

The inspector reviewed the licensee's surveillance program with respect to the radwaste/transportation program. The licensee indicated to the inspector that the past station practice of providing an independent quality control surveillance of each radioactive shipment leaving the station had been modified in July of 1995. At that time, quality hold points were developed that only required partial surveillance of radwaste shipments and exempted radioactive material shipments that were not shipped directly to a low-level radioactive waste disposal facility. The inspector questioned the reduction of management oversight of this program area. After some discussion and review by the licensee, the licensee determined that they would provide quality surveillance reviews for all radioactive material/waste shipments except for limited quantity shipments. The licensee also indicated the intention to develop a methodology to allow the radwaste shipping group to provide their own self-assessment of shipment preparation and documentation to effect the same result. No safety issues or violations were identified.

4.0 TRAINING

The inspector reviewed the training program with respect to NRC IE Bulletin 79-19 requirements. Salem Nuclear Generating Station had four individuals that were authorized to ship radioactive materials/wastes. The inspector checked the training records of each of these individuals and found that each had successfully completed a two-day vendor-supplied course provided on February 6-7, 1995. The inspector reviewed the course materials and the final examination and found that the important shipping regulations were accurately represented and covered. Final examination grades of greater than 70% were satisfied by each of the authorized shipping personnel. The inspector discussed with the licensee the recent publication of the revised NRC and Department of Transportation shipping regulations (10 CFR 71 and 49 CFR 171-178, respectively) and the licensee indicated intentions to retrain the applicable personnel on these regulations in the near future. No discrepancies related to training were noted.

5.0 RADWASTE PROCESSING

The Salem Nuclear Generating Station generated a total of 65 cubic meters of solid radwaste during 1994 and had generated a total of 42 cubic meters from January through September of 1995. The licensee has shown a continuing downward trend in radwaste generation since 1983 when 78,000 cubic meters of radwaste were produced.

Salem Nuclear Generating Station produces primary resin wastes, various filter cartridge wastes, and various contaminated trash, also known as dry active waste (DAW). In addition, miscellaneous waste water is processed through a vendor-supplied filter/demineralizer system. All spent primary resins and vendor-processed spent resins are dewatered in polyethylene containers according to procedure parameters that ensure less than 1% free standing water remains in these containers. The DAW materials are collected and shipped off site to Scientific Ecology Group, Inc. (SEG), for waste segregation and incineration. Since July 1995, when the Barnwell Low Level Radioactive Waste Disposal Facility reopened to allow radioactive waste disposal, the licensee has shipped dewatered spent resin wastes directly to Barnwell without

requiring volume reduction processing by SEG.

The characterization of radioactive shipments is determined through periodic sampling of the predominant solid radwaste streams and offsite radiochemical analysis. From these analytical results, the licensee specifies the difficult to measure isotopes (non-gamma emitting radionuclides) through the use of scaling factors tied to an easily measurable radionuclide such as cobalt-60. The inspector reviewed Procedure SC.RP-RW.ZZ-0902(Q), Rev. 0, "Radioactive Waste Sampling and Classification." The inspector also reviewed the licensee's latest radioactive waste stream radiochemical analytical results. The procedure depicted a sound sampling/characterization methodology. Analytical results were available for the following waste streams: DAW, DTI resin (radwaste resin), primary resin, primary filters, and fuel pool/reactor cavity filters. The DAW waste stream was current within 2 years and all others were analyzed within 1 year. No discrepancies were noted in the radioactive waste stream sampling and waste characterization area.

6.0 TRANSPORTATION

The inspector observed one radioactive material shipment from the Salem Nuclear Generating Station (described in this report) and one radioactive waste shipment from the Hope Creek Nuclear Generating Station (described in NRC Inspection No. 50-354/95-17) during the inspection.

On October 24, 1995, the licensee made the final preparations and shipped an exclusive-use closed transport trailer containing contaminated steam generator maintenance equipment. The inspector observed the loading of the individual boxes of equipment, final survey, and reviewed the shipping records pertaining to the shipment. The inspector observed that two of the shipping containers were empty and did not contain all of the closure bolts (4 out of 12 on one container, and 11 out of 12 on the other). Federal regulations allow empty radioactive material containers to contain contamination up to 0.5 mR/hr on contact with the outside of the package. The licensee ensured that the two empty containers were sealed using the available bolts to provide uniform closure pressure around the lid. The inspector advised the licensee that the newly published federal radioactive shipment regulations that have an April 1, 1996 implementation date, will specify design approval requirements for all shipping packages. Containers that were designed and approved with 12 bolts, will require 12 bolts prior to shipment.

The inspector observed very good loading and bracing of the 15 equipment boxes into the trailer and a tamper seal was attached to the closed trailer by the licensee. Radioactive Material placards were attached on all 4 sides of the transport vehicle and a final radiation survey was conducted by the licensee. All shipping records were completed and emergency directions were given to the driver with his signature attesting to his understanding and compliance with those directions. Approved transport routes were discussed with the driver and the shipment was allowed to leave Salem Station. No discrepancies were noted by the inspector.

The following Salem radioactive material shipment records were reviewed by the inspector.

Shipment No.	Activity (Ci)	Volume (ft^3)	Type
95-29	0.166	2210	Fuel Rack
95-48	0.138	2560	DAW
95-62	0.005	920	Laundry
95-87	0.0005	1573	RCP Motor
95-114	4E-9	1	Samples
95-118	0.0035	1000	Equipment

The inspector questioned the licensee's derivation of activity and radionuclide characterization of shipment number 95-29. The licensee utilized the primary resin waste stream radiochemical analytical results to characterize shipment number 95-29 radioactive constituents. Dose rates of the used fuel racks were obtained and scaling factors representing primary resin wastes were used to determine the radioactive constituents of the fuel racks. The inspector reviewed some swipe sample data that was taken from the fuel rack and compared the gamma-emitting radionuclides with the gamma-emitting radionuclides determined from primary resin wastes as shown below.

	Co-60	Co-58	Sb-125	Cs-137	Cs-134	Mn-54	Co-57	Ag-110m	Nb-95
Fuel Rack	55%	23%	10%	7%	4%	0.4%	0.6%	0.5%	0.4%
Primary Resin	36%	3%	0%	25%	13%	2%	0	0	0
Ratio	1.5	7.6	---	-3.7	13.2	-4.5	----	----	----

The inspector observed that there was a significant variation in ratios of gamma-emitting radionuclides between the fuel rack swipe sample and primary resin radionuclides. Although the final activity determination would not have caused a reclassification of this Low Specific Activity (LSA) shipment, the licensee assumed a waste stream similarity to primary resin that was not well founded. Closer attention to matching waste streams should be made and when comparisons show dissimilarities (as in this case), separate waste stream radiochemical analysis should be obtained to within a factor of ten (as specified in the May 1983 Branch Technical Position on Waste Form).

All other shipping records were determined to be complete and all were determined to meet the applicable requirements of 10 CFR Parts 20, 71 and 49 Parts 171-178. The inspector verified that all consignee licenses were on file as required. The inspector reviewed the following transportation procedures.

SC.RP-RW.ZZ-0906(Q), Rev. 3, "Shipment of Radioactive Waste for Burial"
SC.RP-RW.ZZ-0909(Q), Rev. 3, "Shipment of Radioactive Materials Excluding Waste for Burial"
SC.RP-RW.ZZ-0911(Q), Rev. 0, "Use of the NUPAC 14-210 or CNSI 14-215 Radioactive Materials Shipping Package"
NC.RP-TI.ZZ-0915(Q), Rev. 0, "Shipment and Receipt of Laundry"
NC.RP-TI.ZZ-0930(Q), Rev. 0, "Interim Low Level Radwaste Transfer and Storage"

The procedures reviewed, were of excellent quality with no discrepancies noted. No safety concerns or violations were identified.

7.0 ONSITE RADWASTE STORAGE

The Salem radwaste building contains an inplant shielded high radiation storage area where various used mechanical filter elements are stored. The licensee maintains an excellent inventory of individual filters and at the time of this inspection, had in storage approximately 25 primary filters and 27 other miscellaneous filters. The inplant storage consisted of less than 1 polyethylene liner shipment of waste filters.

The licensee completed construction and began operation of an onsite radwaste storage facility in late 1994. This facility, Building 41, was designed for the storage of solid radioactive wastes as generated by both Salem and Hope Creek Stations during time periods when a commercial disposal facility was not available. This facility is 68' X 266' and consists of a concrete and steel structure designed to hold approximately 1870 cubic meters of radwaste. This facility consists of a 2-foot thick concrete walled internal vault area for the higher dose rate wastes and the outside walls of Building 41 are 1-foot thick concrete shielding. An overhead crane is operated remotely from a shielded control room area utilizing closed circuit television camera. In addition, the crane hooks mate with radwaste container handling pallets and strongbacks without the need for rigging personnel in the area.

At the time of this inspection, the licensee was in the process of emptying the Building 41 onsite radwaste storage facility. Remaining radwaste stored in the facility consisted of 1 polyethylene liner of spent DTI resin and 8 boxes of DAW ash/compacted wastes returned from SEG. In addition, Hope Creek radwastes included approximately 44, 55-gallon drums of bituminous waste media. Hope Creek was also in the process of transferring the remaining 85, 55-gallon drums of bituminous waste located inside the Hope Creek facility out to Building 41 to allow for radwaste shipment staging and packaging activities. The inspector observed a high degree of activity directed to shipping all remaining radioactive wastes currently in storage at both Salem and Hope Creek Stations. An area for enhancement was suggested to the licensee. Inside Building 41, there currently is no status board or other reference available to determine the building waste inventory or the location of individual waste containers in the building. A waste location/inventory reference located in the facility would improve the coordination of waste container movement activities conducted by crane operators and support personnel. In summary, the radwaste storage onsite was very low with very few shipments of radwaste remaining. No safety concerns or violations were identified.