

(DCS Numbers - see  
attached sheet)

U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION I

Report Nos. 50-272/82-19  
50-311/82-19

Docket Nos. 50-272  
50-311

License Nos. DPR-70  
DPR-75

Licensee: Public Service Electric and Gas Company  
80 Park Plaza  
Newark, New Jersey 07101

Facility Name: Salem Nuclear Generating Station - Units 1 and 2

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: August 4 - August 31, 1982

Inspectors: *L. J. Norrholm* 9/2/82  
L. J. Norrholm, Senior Resident Inspector date

*R. Summers* 9-2-82  
R. Summers, Resident Reactor Inspector date

Approved By: *L. E. Tripp* 9/7/82  
L. E. Tripp, Chief, Reactor Projects Section No. 2A, date  
Projects Branch No. 2, DPRP

Inspection Summary:

Inspections on August 4-31, 1982 (Combined Report Numbers 50-272/82-19 and 50-311/82-19)

Unit 1 Areas Inspected: Routine inspections of plant operations including tours of the facility; conformance with Technical Specifications and operating parameters; log and record reviews; reviews of licensee events; and followup on previous inspection items. The inspection involved 76 inspector hours by the resident NRC inspectors.

Results: One violation was identified (Failure to follow radiation protection procedures - Paragraph 3B).

Unit 2 Areas Inspected: Routine inspections of plant operations including tours of the facility; conformance with Technical Specifications and operating parameters; log and record reviews; reviews of licensee events; and followup on previous inspection items. The inspection involved 63 inspector hours by the resident NRC inspectors.

Results: One violation was identified (Failure to follow radiation protection procedures - Paragraph 3B).

Report Nos. 50-272/82-19 and 50-311/82-19

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## DETAILS

### 1. Persons Contacted

J. Driscoll, Assistant General Manager - Salem Operations  
L. Fry, Operations Manager  
J. Gallagher, Maintenance Manager  
B. Leap, Station QA Engineer (Acting)  
J. Gueller, Operating Engineer  
J. Hagan, Maintenance Engineer  
J. Jackson, Technical Engineer  
H. Midura, General Manager - Salem Operations  
L. Miller, Technical Manager  
J. O'Connor, Radiation Protection Engineer

The inspector also interviewed other licensee personnel during the course of the inspections including management, clerical, maintenance, operations, performance and quality assurance personnel.

### 2. Status of Previous Inspection Items

(Closed) Unresolved Item (272/81-23-05) Failure of Fire Pump 2. On July 28, 1982, the licensee submitted a supplement to Licensee Event Report 81-60 which detailed an eleven week period during which one diesel fire pump was inoperable and fire suppression capability relied on the other pump and the Hope Creek site cross connect. The diesel required a complete overhaul during which several failed components were replaced. A subsequent analysis by the manufacturer attributed the failures to a seized accessory drive shaft caused by inadequate lubrication during rapid startup. The shaft was re-designed to provide more oil ports for better prompt lubrication. The modified shaft has also been provided in the Number 1 Pump. No similar engine failures have occurred during numerous rapid starts since the modification. The inspector had no further questions on this item.

(Closed) Unresolved Item (272/81-23-02) Diesel water jacket leak due to broken pipe nipple. On August 12, 1982, the licensee supplemented Licensee Event Report 81-53 to provide additional information with respect to this leak. Use of the nipple for support of personnel is given as the apparent cause of failure. Corrective action includes discussion of such damage in the station training program. This action will be evaluated during routine inspection of station training.

### 3. Review of Plant Operations

#### A. Daily Inspection

The inspector toured the control room area to verify proper manning, access control, adherence to approved procedures, and compliance with LCOs. Instrumentation and recorder traces were observed. Status of control room annunciators was reviewed. Nuclear instrument panels and other reactor protective systems were examined. Control rod insertion limits were verified. Containment temperature and pressure indications were checked against Technical Specifications. Effluent monitors were reviewed for indications of releases. Panel indications for onsite/offsite emergency power sources were examined for automatic operability. During entry to and egress from the protected area, the inspector observed access control, security boundary integrity, search activities, escorting, badging, and availability of radiation monitoring equipment.

The inspector reviewed shift supervisor, control room, and field operator logs covering the entire inspection period. Sampling reviews were made of tagging requests, night orders, the jumper/bypass log, incident reports, and QA nonconformance reports. The inspector also observed several shift turnovers during the period.

The above daily inspections, which included back shifts, were made on August 4-6, 9-13, 16-18, 22-27, and 30-31.

No unacceptable conditions were identified.

#### B. Plant Tours

The inspector toured accessible areas of the plant at least once per week. The tours included the control rooms, relay rooms, switchgear rooms, penetration areas, auxiliary building (elevations 122', 100', 84', 64', 55'), fuel handling building, turbine building, service water intake structure, plant perimeter and containment. During these tours, observations were made relative to equipment condition, fire hazards, fire protection, adherence to procedures, radiological controls and conditions, housekeeping, security, tagging of equipment, ongoing maintenance and surveillance, and availability of redundant equipment.

Operability of the following Units 1 and 2 ESF subsystems was verified by confirming flowpath valve positions, breaker alignment, instrumentation and equipment condition: Containment Spray (both trains - Auxiliary Building), Auxiliary Feedwater (3 trains - Auxiliary Building and Penetrations), Safety Injection (both trains - Yard, Auxiliary Building and Penetrations), Service Water (both trains - Yard, Auxiliary Building).

Current tagouts of selected components were verified in effect as specified. Records of current surveillance for tank boron concentrations, shutdown margin and pump testing were reviewed. The inspector conducted a complete walkdown of Units 1 and 2 Diesel Generator Starting Air System, to examine conformance with as-built drawings, lineups, supports, instrumentation, electrical and controls cabinets and to confirm availability of the systems.

The following Limiting Conditions for Operation, not directly verifiable in the control room, were confirmed by field inspection or record review: service water availability to Auxiliary Feedwater (3.7.1.3), Fire barriers (3.7.11), Diesel fuel inventory (3.8.1.1), and CARDOX system availability (3.7.10.3).

During a tour on August 6, 1982, the inspector noted that electric power was unavailable to the "Contractor Gate House", one of two egress points from the station. This rendered the portal monitors inoperable at this location. Personnel were observed egressing after using a portable radiation monitor; however, it was determined that none of the portable radiation monitors in use functioned properly because of faulty battery power supplies. Procedure AP-24, Radiological Protection Program, requires that personnel shall monitor themselves when leaving the station. Failure to make personnel surveys constitutes a violation of Technical Specification 6.11 and AP-24 (272/82-19-01; 311/82-19-01).

#### 4. Review of Periodic and Special Reports

Upon receipt, periodic and special reports submitted by the licensee pursuant to Technical Specification 6.9.1 and 6.9.2 were reviewed by the inspector. The reports were reviewed to determine that the report included the required information; that test results and/or supporting information were consistent with design predictions and performance specifications; that planned corrective action was adequate for resolution of identified problems; and, whether any information in the report should be classified as an abnormal occurrence.

The following periodic and special reports were reviewed:

- Unit 1 Monthly Operating Report - July 1982
- Unit 2 Monthly Operating Report - July 1982
- Unit 1 Cycle 4 Startup Test Report, dated August 3, 1982
- Unit 1 Report of Examinations and Tests conducted during Cycle 4 outage in accordance with IE Circular 76-06, dated August 5, 1982

No unacceptable conditions were identified.

5. Licensee Eventsa. In Office Review of Licensee Event Reports

The inspector reviewed LERs submitted to the NRC:RI office to verify that details of the event were clearly reported, including the accuracy of the description of cause and adequacy of corrective action. The inspector determined whether further information was required from the licensee, whether generic implications were involved, and whether the event warranted onsite followup. The following LERs were reviewed:

UNIT 1

- \* 82-43/03L      Containment Plant Vent Radioactivity Monitor - Inoper
- \* 82-45/03L      No. 12 Waste Monitor Tank - Liquid Release Sample Dis:    ded
- \* 82-46/03L      Penetration Fire Barriers - Non-Functional
- 82-47/03L      Containment Plant Vent Radioactivity Monitor Inoperable  
due to tripped breaker
- 82-48/03L      Containment Air Lock - 100' Elevation Inoperable due to  
seal leakage
- 82-49/03L      Wide Range Pressure Instrument Inoperable due to failed  
printed circuit board
- 82-50/03L      Atlantic loggerhead turtle impinged on Circulating Water  
System intake trash bars

UNIT 2

- \* 82-59/03L      Steam Generator Relief Valve 23MS15 - Inoperable
- \* 82-60/03L      Emergency Core Cooling System Accumulator - Inoperable
- 82-61/03L      No. 21 Steam Generator Level Channel II Instrument -  
Inoperable
- \* 82-62/03L      Fire Protection Spray and/or Sprinkler Systems - Missed  
Surveillance
- \* 82-63/03L      No. 2A Vital Bus - Energized
- \* 82-64/03L      Emergency Core Cooling System Vital Heat Tracing -  
Inoperable



UNIT 2

- 82-65/03L No. 24 Containment Fan Coil Unit - Inoperable due to failed Flow Control Valve Actuator
- 82-66/03L No. 21 Steam Generator Steam Flow Channel II - Inoperable due to Failed Capacitors
- 82-67/03L No. 24 Steam Generator Feedwater Channel 2 - Inoperable due to Failed Transmitter

b. Onsite Licensee Event Followup

For those LERs selected for onsite followup (denoted by asterisks in detail paragraph 5a), the inspector verified the reporting requirements of Technical Specifications and Regulatory Guide 1.16 had been met, that appropriate corrective action had been taken, that the event was reviewed by the licensee as required by AP-4 and 6, and that continued operation of the facility was conducted in accordance with Technical Specification limits. The following findings relate to the LERs reviewed on site:

UNIT 1

- 82-43/03L This is the second occurrence of this event within 3 weeks. The report attributes the high use rate of Air Particulate Detector paper to excessive operation in fast speed and describes corrective action as counseling of operators. Due to the frequency of pressure relief operations on Unit 1 and the procedural requirement (OI II-12.3.3) to purge the unit for at least 7 seconds, the inspector questioned the effectiveness of the proposed action. This item remains unresolved pending further review by the inspector (272/82-19-02).
- 82-45/03L The inspector confirmed that a marked, clearly-defined, area was established in the counting room for storage of composite liquid waste samples. The inspector had no further questions on this event.
- 82-46/03L Improperly sealed fire barrier penetrations were discovered during conduct of periodic surveillance using a new procedure which provides more detail and requires the persons performing the inspection to search for additional penetrations, not already listed. The mode of discovery constitutes apparently effective corrective action for this event. Separate procedures cover new penetrations which may result from modifications or maintenance activities.

UNIT 2

82-59/03L

This event is discussed in NRC Inspection Report 50-311/82-17. Operation of Unit 2 has continued with reduced flux level trip points (87%) as a result of gagging safety valve 23MS15. Further inspection of the valve manual operating mechanism is planned for the next extended cold shutdown. Following a determination of the cause for premature actuation, a supplemental report will be submitted. This item is unresolved pending review of the LER supplement (311/82-19-02).

82-60/03L

Due to transmitter drift and an inability to calibrate as a result of leaking isolation valves, both remote level indicators on Accumulators 23 and 24 were declared inoperable. To comply with Technical Specification Surveillance Requirements to verify water level every 12 hours, the licensee has installed isolable standpipes at the accumulators. Through frequent spot-checks the inspector confirmed that containment entries are made as required to verify the level.

82-62/03L

This failure to conduct surveillance of automatic valves in fire systems resulted from premature cancellation of one administrative system before the replacement system was in place. When conducted, the surveillance test was satisfactory. The inspector sampled five additional fire protection surveillance requirements and confirmed that the tests were current. This event appears to have been an isolated case discovered by the licensee's own review process.

82-63/03L

2A Vital Bus was de-energized due to spurious and incomplete operation of 2A Safeguards Equipment Cabinet (SEC) as a result of integrated circuit failures which may have been precipitated by an identified sensitivity to electrical noise. Noise attenuation is addressed by Design Change 2EC1387, scheduled for completion during the next outage. Similar modifications to Unit 1 appear to have been effective.



82-64/03L

Two channels of vital heat trace were inoperable due to broken wires; however, the redundant channels were available. In the course of investigating the event, the licensee identified apparent problems with testability, choice of test instruments and acceptance criteria. An evaluation was initiated to address these concerns. This item is unresolved pending completion of the evaluation and review of consequent corrective actions (311/82-19-03).

## 6. Operating Events

### UNIT 1

- a. On August 9, 1982, at approximately 3:58 p.m., the Unit 1 No. 12 Miscellaneous AC 115 Volt Distribution Panel lost its power supply (No. 12 Station Essential Controls Inverter). This led to a loss of control voltage to a number of plant systems including the No. 11 Main Feed Pump Turbine. As a result of the steam flow-feed flow mismatch and decreasing levels in the Steam Generator, the Senior Shift Supervisor ordered the unit tripped. All safety systems responded normally to the manual trip. A subsequent investigation into the cause of the event determined that the No. 12 Station Essential Controls Inverter breaker was in the "off" position. It was further determined through testing that this position is not the "tripped" position associated with any automatic protection action. It appears that this position could only be achieved manually. Thus, deliberate action was suspected.

As an immediate action, the licensee implemented a number of surveillances of safety related equipment on both units, including start verification of rotating ECCS equipment, start test and loading of the Emergency Diesel Generators, critical valve lineup verification, inspection of various motor control centers and safety related panels, and increased presence of roving patrols throughout the power block. No other discrepancies were found. The plant was taken critical at 8:50 a.m. on August 10, 1982. Additional details of NRC review of this event are discussed in Investigation Report 50-272/82-21.

- b. At 3:38 a.m. on August 27, 1982, the reactor tripped on indicated high Pressurizer water level. The unit had been operating with Pressurizer Level Channel III out of service and its respective trip bistables tripped. A spurious high level spike on Pressurizer Level Channel I was experienced causing the reactor trip. All safety systems responded normally during the event. The unit was critical at 6:58 a.m. and synchronized at 12:01 p.m. on August 27.

This was the third instance of apparent feedback into Channel I while work was being performed on Channel III. Neither of the other two cases resulted in any plant protection actuation. The licensee did receive a verbal evaluation from their Engineering Department stating that necessary independence and separation criteria were not compromised. This was to be followed up with a written evaluation. This matter will be left unresolved pending review of the evaluation and results of future testing to determine the possible cause of the events (272/82-19-03).

- c. At about 10:00 p.m. on August 27, the plant vent monitor count rate increased to 100,000 counts per minute. Since the normal range for this monitor is less than 1000 cpm, the licensee considered the increase an unplanned gaseous release and so notified the NRC Duty Officer in accordance with 10 CFR 50.72. The monitor alarm setpoint is 500,000 cpm, a value representing the instantaneous release limit of the Environmental Technical Specifications. Initial attempts to isolate the source of the activity focused on the Volume Control Tank area and a small leak on a relief valve was repaired, resulting in some decrease in the vent activity. At about 10:00 p.m. on August 28, the monitor was again reading 100,000 cpm and another ENS report was made. At about the same time, an accumulation of water in the reactor coolant filter cubicle led to a finding that the filter cover bolts were not tight. The filter had been replaced earlier in the week. The bolts were properly tightened and the system returned to service. By the evening of August 29, plant vent activity had returned to normal. Based on plant vent monitor readings, the release rate did not exceed 20% of the instantaneous release rate limit. Grab sampling during the release indicated that the plant vent monitor may be overestimating releases by up to two orders of magnitude. Since the plant vent monitor is used to monitor continuous gaseous releases from the plant, inaccuracy could result in improper reporting of these releases. This matter is unresolved pending review of the licensee's determination of the plant vent monitor accuracy and corrective actions if necessary (272/82-19-04).

## UNIT 2

- a. At about 8:05 p.m. on August 9, 1982, during containment inspection to determine the levels in accumulators 23 and 24, operators discovered leakage coming from the #24 Containment Fan Coil Unit (CFCU). A subsequent inspection revealed a Service Water leak of about 0.5 gpm in a coil of CFCU 24. The leak was isolated and repaired.

At 2:00 a.m. on August 13, 1982, during containment inspection following up on increased sump leakage, a service water leak was identified on Containment Fan Coil Unit 23. Leak rate was about 1.5 gpm and the unit was isolated and repaired.

At about 10:30 a.m. on August 12, 1982, a leak was reported on Containment Fan Coil Unit 22. The apparent leak rate was on the order of 1 quart per hour. Subsequent investigation found that no leak existed and the water collected from the cooling coils was condensation containing some residual chlorides from previous leaks. The NRC was later informed that the report was premature.

During containment entries to verify accumulator levels and to investigate increased sump leakage, three service water leaks from Containment Fan Coil Units coils were identified. The units, and time of discovery, were: No. 25 at 8:37 p.m. on August 13, No. 22 at 10:00 a.m. on August 14, and No. 24 at 10:55 a.m. on August 15. In each case, the leak was 1 gallon per minute or less and was isolated. As of 2:50 a.m. on August 16, all had been repaired and were operable. The units were repaired within the shortest applicable Action Statement interval; 72 hours.

During containment inspection to determine the cause of increased leakage to the sump, a 1 gpm coil leak was found on Containment Fan Coil Unit 21 at 2:25 a.m. on August 17. The unit was isolated and repaired.

At 8:50 a.m. on August 21, during containment inspection to determine the cause of increased sump leakage, a primary coil leak was discovered in Containment Fan Coil Unit 24. The service water leak, on the order of 1.5 gpm, was isolated immediately. Due to an existing leak on CFCU 25, found on August 19, repairs were required within 72 hours. CFCU 24 was repaired and returned to service on August 22. Repairs to CFCU 25 were completed August 23.

During containment inspections to determine the cause of increased leakage to the sump, service water leaks of less than 1 gpm were found in cooling coils of Containment Fan Coil Units 24 and 23 at 3:45 p.m. on August 27 and 10:35 p.m. on August 29, respectively. In each case, the unit was immediately isolated and repaired. Following repairs and return to service on August 30, an additional 0.1 gpm coil leak was discovered on CFCU 23. The unit was again isolated and repairs completed the same day. Due to continuing problems with service water leakage, all CFCU cooler coils and associated containment piping will be replaced during the Spring 1983 refueling outage.

- b. On August 16, 1982, at approximately 5:25 p.m., a shift equipment operator on tour found the manual isolation stop valve to each set of two air start motors (four total) for the 2C Diesel Generator (DG) in the shut position. This condition would have prevented automatic or manual start of the DG (one of three). The operator stated that these valves, which are part of his routine check during rounds, were open at about 5:00 p.m. on August 15. Subsequent investigation by site personnel found no reason for the position of the valves being changed during that interval and established that these valves were open at about 1:00 p.m. on August 16. Although work activities were in progress in the DG area during this time interval, none should have involved manipulation of these stop valves.

Due to the possibility of deliberate tampering, the licensee conducted operability checks of all rotating ECCS equipment, started and loaded all diesel generators, inspected various motor control centers and safety related electrical panels, and sampled all fuel and water tanks. Equipment checks identified no other abnormal conditions. Other precautionary measures, initiated after a suspected Unit 1 tampering event on August 9, were still in place. These included: management presence on site at all times, once-per-shift position verification of important to safety valves and electrical equipment, and increased surveillance by security and supervisory personnel.

At 8:45 p.m. on August 16 when the mispositioned valves could not be explained, the licensee notified the Senior Resident Inspector of a suspected act of tampering.

After declaring an Unusual Event at 10:00 p.m., the licensee notified the NRC Duty Officer, state and local agencies, and the FBI. The Resident Inspector returned to the site at 11:00 p.m. to confirm licensee actions. Region I management and IE representatives met with licensee management on August 17 to discuss appropriate additional actions to be taken. These actions are documented in licensee correspondence dated August 18, 1982 and confirmed in NRC Region I Confirmatory Action Letter 82-22 dated August 18, 1982. The inspectors verified that the additional measures had been taken. Additional details relating to these actions are provided in NRC Inspection Report 50-311/82-23.



Rendering a diesel generator inoperable without prior testing of the two operable engines and without acknowledgement of the 72 hour Action Statement is contrary to the licensee's procedures. Due to the prompt detection and correction of this problem by alert operators and the aggressive and timely steps taken by the licensee to prevent recurrence, enforcement action is not considered appropriate in this case.

- c. At 8:00 p.m. on August 20, during scheduled functional testing, the "B" reactor trip breaker failed to trip open when required. In accordance with Technical Specifications, the licensee initiated a power reduction in order to be in Hot Standby within six hours. At 10:06 p.m., the breaker had been replaced with the "A" bypass breaker and tested. The power reduction was terminated at 73%. Investigation indicated an open undervoltage coil, which was replaced. The licensee declared an Unusual Event and made required 50.72 reports of an impending shutdown required by Technical Specifications.

## 7. Surveillance Testing

The inspector observed the performance of surveillance tests to confirm the following: testing was performed in accordance with adequate procedures; test instrumentation was calibrated; limiting conditions for operations were met; removal and restoration of the affected components were properly accomplished; test results conformed with Technical Specification and procedural requirements and were reviewed by personnel other than the individual performing the test; deficiencies noted were reviewed and appropriately resolved; personnel performing the surveillance activities were knowledgeable of the systems and the test procedures and were qualified to perform the tests.

These observations included:

- 1 PD 4.2.005 Channel Functional Test, 1-R 11A Containment or Vent Air Particulate (Beta/Gamma), Revision 4, dated January 22, 1982
- 1 PD 2.10.189 Channel Calibration Procedure, 1LT-935D Accumulator No. 14 Indication and Alarm, Revision 1, dated July 14, 1981
- 2 PD 2.6.066 Channel Functional Test, 2PT-948A Containment Pressure Protection - Channel IV, Revision 1, dated October 5, 1981
- 1 PD 2.6.002 Channel Functional Test, 1FT-414 Reactor Coolant Flow Loop 1 Channel 1, Revision 3, dated November 23, 1981



## 8. Maintenance Activities

The inspector observed portions of maintenance activities to determine that the work was conducted in accordance with approved procedures, regulatory guides, Technical Specifications, and industry codes or standards. The following items were considered during this review: limiting conditions for operation were met while components or systems were removed from service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing was performed prior to declaring that particular component as operable; activities were accomplished by qualified personnel; radiological controls were implemented; and fire prevention controls were implemented.

Activities observed included:

- Troubleshooting the 4KV Breaker for 15 Service Water Pump
- Repairs to the Nos. 11 and 21 Boric Acid Transfer Pumps
- Repairs to the No. 11 Component Cooling Heat Exchanger

No unacceptable conditions were identified.

## 9. Unresolved Items

Areas for which more information is required to determine acceptability are considered unresolved. Unresolved items are contained in Paragraphs 5b and 6.

## 10. Exit Interview

At periodic intervals during the course of this inspection, meetings were held with senior facility management to discuss inspection scope and findings.