

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report Nos. 50-272/83-38
50-311/83-37

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: December 6, 1983 - January 10, 1984

Inspectors: *James C. Linville* 1/18/84
J. C. Linville, Senior Resident Inspector date

Robert J. Summers 1/18/84
R. J. Summers, Resident Reactor Inspector date

Approved By: *L. J. Morrholm* 1/19/84
L. J. Morrholm, Chief, Reactor Projects Section No. date
2B, Projects Branch No. 2, DPRP

Inspection Summary:

Inspections on December 6, 1983 - January 10, 1984 (Combined Report Numbers 50-272/83-38 and 50-311/83-37)

Areas Inspected: Routine inspections of plant operations including: status of previous inspection items, review of periodic and special reports, licensee event report review, operational safety verification, surveillance observations, maintenance observations, operating events, ESF system walkdown, nuclear oversight committee observation, nuclear review board observation and hydrogen recombiner problem review. The inspection involved 166 inspector hours by the resident NRC inspectors.

Results: There were no violations and no major issues of concern.

Report Nos. 50-272/83-38 and 50-311/83-37 DCS Numbers:

050272-831110	050311-831107
050272-831111	050311-831108
050272-831112	050311-831118
050272-831115	050311-831125
050272-831118	050311-831128
050272-831122	050311-831202
050272-831128	050311-831207
050272-831203	
050272-831209	
050272-831225	
050272-831226	
050272-831230	
050272-831231	
050272-840101	
050272-840102	
050272-840107	
050272-840110	

DETAILS

1. Persons Contacted

- J. Driscoll, Assistant General Manager - Salem Operations
- L. Fry, Operations Manager
- J. Gallagher, Maintenance Manager
- L. Catalfomo, Operating Engineer
- J. Jackson, Technical Engineer
- * E. Liden, Manager Licensing and Regulation
- L. Miller, Technical Manager
- R. Newman, Maintenance Engineer
- J. O'Connor, Radiation Protection Engineer
- D. Perkins, Station QA Engineer
- * D. Tauber, Senior Staff Engineer
- * J. Zupko, Jr., General Manager - Salem Operations

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

- * Present at exit interview

2. Status of Previous Inspection Items

- (Closed) Unresolved Item (311/81-21-03) This item concerned leakage by the PORVs and POPs valves while in mode 5 necessitating the establishment of an RCS vent path. In a supplement to LER 81-017 submitted on September 15, 1983, the licensee stated that the PORVs had been modified to correct the leakage problem and to assume the POPs function per DCRs 2EC-1599 and 2SC-1245 respectively. The inspector witnessed portions of the latter modification as documented in paragraph 6B of Inspection Report 50-311/83-30. The removal of the previous POPs valves manufactured by Marotta Scientific Controls is scheduled for the next extended outage.
- (Closed) Unresolved Item (311-83-24-09) This item involved operator failure to take corrective action when No. 23 Accumulator level was outside the Technical Specification limits as reported in LER 311/83-35/01P. The inspector reviewed Safety Evaluation 8-2-N600-NSE-220 referenced in the supplemental LER which concluded that the accumulator was not inoperable even though it was outside the allowable limits. This was based on a determination that sufficient cover gas pressure remained to fully inject the accumulator volume with the level slightly out of specification.

3. Review of Periodic and Special Reports

Upon receipt, the inspector(s) reviewed periodic and special reports. The review included the following: inclusion of information required by the NRC; test results and/or supporting information consistent with design predictions and performance specifications; planned corrective action for resolution of problems, and reportability and validity of report information. The following periodic reports were reviewed:

- Unit 1 Monthly Operating Report - December 1983
- Unit 2 Monthly Operating Report - December 1983
- Radioactive Effluent Release Report, RERR-14, for the period January - June 1983

4. Licensee Event Report (LER) Review

The inspector(s) reviewed LER's to verify that the details of the events were clearly reported. The inspector(s) determined that reporting requirements had been met, the report was adequate to assess the event, the cause appeared accurate and was supported by details, corrective actions appeared appropriate to correct the cause, the form was complete and generic applicability to other plants was not in question.

Unit 1

- | | |
|-------------|--|
| 83-54/03L | Reactor Trip System Instrumentation - Intermediate Range Channel N-35 High Flux Setpoint - Out-of-Specification |
| * 83-55/03L | Reactor Coolant System - Unidentified Leakage - Out-of-Specification |
| 83-56/03L | DNB Parameters - Pressurizer Pressure - Out-of-Specification |
| 83-57/03L | Containment Systems - No. 11 Hydrogen Analyzer - Inoperable |
| 83-58/03L | Containment Systems - 100' El. Containment Air Lock - Inoperable |
| 83-59/03L | Containment Systems - 130' El. Containment Air Lock - Inoperable |
| 83-60/03L | Emergency Core Cooling System - Boron Injection Flow Path - Vital Heat Tracing - Point 602B - Inoperable |
| * 83-61/03L | Reactor Trip System and Engineered Safety Feature Actuation System Instrumentation - Surveillance Testing - Not Completed Within Time Interval Specified |
| * 83-62/99X | Seismic Instrumentation - Reactor Containment 81' El. - Triaxial Time-History Accelograph - Inoperable |
| * 83-66/01T | Fire Suppression Water Systems - Inoperable |

Unit 2

- * 83-58/03L Electrical Power Systems - 2B Diesel Generator - Inoperable
- * 83-59/03L Electrical Power Systems - 2B Safeguards Equipment Control - Incomplete Sequence Alarm
- * 83-60/01T Electrical Power Systems - 2A and 2B Vital Instrument Inverters - Inoperable
- 83-61/03L Electrical Power Systems - 2A Safeguards Equipment Control - Inadvertent Actuation
- * 83-62/03L Reactor Coolant System - Residual Heat Removal System - Loss of Flow
- * 83-63/03L Electrical Power Systems - 2C Diesel Generator - Test Failures
- 83-64/03L Low Pressure CO₂ Fire Suppression Systems - Inoperable
- * 83-65/03L Electrical Power Systems - 2B Diesel Generator - Test Failure
- * Indicates onsite followup

Unit 1

- 83-55/03L This LER details a reactor shutdown to correct and repair unidentified reactor coolant system leaks whose total was approaching the 10 gpm Technical Specification limit. Inspector review of this event is discussed in paragraph 10 of Inspection Report 50-272/83-36 and an unresolved item is documented in paragraph 5 of Inspection Report 50-311/83-33 on the licensee method of calculating unidentified RCS leakage.
- 83-61/03L This report documents an occurrence in which Solid State Protection System (SSPS) Train B was inoperable due to testing for a period greater than allowed by Technical Specifications. The operators initiated a shutdown in accordance with the LCO action requirements and subsequent to successful completion of the SSPS test, stopped the unit shutdown. Recent changes to the SSPS test procedures have been made to implement better functional testing of the Reactor Trip Breakers. These tests, in the past, could be conducted within the 1 hour time frame allotted by the Technical Specification. However, now, it appears that the functional tests require additional time to complete. The licensee submitted LCR 83-17 on December 27, 1983, to change the Unit 1 Technical Specifications to be consistent with the Unit 2 LCO for SSFS testing. This would increase the time allowed for testing from 1 hour to 2 hours. This change, if approved, should provide sufficient time for test completion.

- 83-62/99X This report documents the failure of one channel of seismic instrumentation. The instrument was located within the bio-shield and access to this area was restricted during power operations. A subsequent outage occurred on December 30, 1983, and the failed instrumentation was replaced. The LER states that the failed instrument will be analyzed to determine the cause of failure. The inspector will review the supplemental report when submitted (272/83-38-01).
- 83-66/01T This report detailed the inoperability of the fire suppression water systems due to the storage tanks containing less than the minimum required amount of water. Two events are documented in the report. The first was a result of a pipe break in the fire protection system due to freezing conditions. A procedure was subsequently issued to check all areas containing fire suppression water systems to prepare for cold weather effects. The second event was a result of exceeding the makeup capacity of the system. Again, the cause was attributed to various leaks that occurred as a result of the freezing weather conditions. Another similar event occurred subsequent to these events and will be documented in LER 83-072/01T. The licensee is investigating the cause of that event and further corrective actions, if necessary, will be reported. The inspector will review the cause(s) and corrective actions as documented in LER 83-072 during a subsequent inspection.

Unit 2

- 83-58/03L This LER detailed the failure of the fuel oil pump coupling due to loose set screws on No. 2B Emergency Diesel Generator and indicated that a coupling check would be incorporated into the 18 month diesel maintenance procedure. The inspector determined through discussions with licensee personnel and review of the maintenance department tracking system that a draft revision to procedure Mi5A had been typed to incorporate this item.
- 83-59/03L This LER described the restripping and reloading of 2B vital bus after it had been initially properly stripped and loaded by 2B SEC during a manual safety injection surveillance test. Inspector review of this event is documented in paragraph 6 of Inspection Report 50-311/83-36.

- 83-60/01T This report discusses a failure to establish containment integrity with less than the minimum specified power supplies available in mode 5. Inspector review of this event is documented in paragraph 10B of Inspection Report 50-311/83-36.
- 83-62/03L This LER details a loss of Residual Heat Removal system flow while changing 2A vital instrument bus power supply from the inverter to the solatron. The licensee will conduct a procedure review to incorporate steps or precautions to prevent the loss of power to important equipment during power supply changes. The inspectors will review the results during a subsequent inspection (311/83-37-01).
- 83-63/03L This LER describes the failure of 2C Emergency Diesel Generator to accelerate to full speed during a manual safety injection surveillance test. Inspector review of this event is documented in paragraphs 6 and 7b of Inspection Report 50-311/83-36. The inspector will review the supplemental report during a subsequent inspection (311/83-37-02).
- 83-65/03L This report details a failure of 2B Emergency Diesel Generator due to a grounded voltage regulator transformer. Since the existing transformer was obsolete, the licensee initiated a design change request (DCR) to install the vendor recommended replacement transformer. Inspector observation of troubleshooting this event is documented in paragraph 7 of this report. The inspector will review the DCR and the results of the seismic qualification testing during a subsequent inspection (311/83-37-03).

5. Operational Safety Verification

a. Control Room Observations

Daily, the inspector(s) verified selected plant parameters and equipment availability to ensure compliance with limiting conditions for operation of the plant Technical Specifications. Selected lit annunciators were discussed with control room operators to verify that the reasons for them were understood and corrective action, if required, was being taken. The inspector(s) observed shift turnovers biweekly to ensure proper control room and shift manning. The inspector(s) directly observed operations to ensure adherence to approved procedures.

b. Shift Logs and Operating Records

Selected shift logs and operating records were reviewed to obtain information on plant problems and operations, detect changes and trends in performance, detect possible conflicts with Technical Specifications or regulatory requirements, determine that records are being maintained and reviewed as required, and assess the effectiveness of the communications provided by the logs.

c. Plant Tours

During the inspection period, the inspector(s) made observations and conducted tours of the plant. During the plant tours, the inspector(s) conducted a visual inspection of selected piping between containment and the isolation valves for leakage or leakage paths. This included verification that manual valves were shut, capped and locked when required and that motor operated valves were not mechanically blocked. The inspector(s) also checked fire protection, housekeeping/cleanliness, radiation protection, and physical security conditions to ensure compliance with plant procedures and regulatory requirements.

d. Tagout Verification

The inspector(s) verified that selected safety-related tagging requests were proper by observing the positions of breakers, switches and/or valves.

No violations were observed.

6. Surveillance Observations

The inspector(s) observed portions of the surveillance procedures listed below to verify that the test instrumentation was properly calibrated, approved procedures were used, the work was performed by qualified personnel, limiting conditions for operation were met, and the system was correctly restored following the testing:

- M16C-1, Hydrogen Recombiners, 6 Month Functional Test - Unit 1
- M3B, SEC Sequencer Test, and M3U, SEC Output Relay Time Response Test on 2A SEC
- 1PD 18.1.010, Solid State Protection System Train A Reactor Trip Breaker and Undervoltage Coil Channel Functional Test
- 2SP(0) 4.3.2.1a, Manual Safety Injection

No violations were identified.

7. Maintenance Observations

- a. The inspector(s) observed portions of various safety-related maintenance activities to determine that redundant components were operable, these activities did not violate the limiting conditions for operation, required administrative approvals and tagouts were obtained prior to initiating the work, approved procedures were used or the activity was within the "skills of the trade," appropriate radiological controls were properly implemented, ignition/fire prevention controls were properly implemented, and equipment was properly tested prior to returning it to service.
- b. During this inspection period, the following activities were observed:
 - Troubleshooting of 2B Emergency Diesel Generator voltage regulator transformer failure per work order MD 941782
 - Repair of No. 12 Steam Generator main steam stop valve 12MS167 per work order MD 944796
 - Replace 2A SEC 15 VDC power supply per DCR 2EC 1785 and work order MD 941241
 - Repair 14 CFCU coil stack discharge expansion joint per work order MD 939465

With respect to the repairs to 14 CFCU, the licensee was unable to replace the failed expansion joint with vendor supplied materials at this time. Therefore, a temporary repair was approved thru resolution of Deficiency Report MD 83-3083, utilizing a double wrap of the entire expansion joint with 1/32" thick nylon reinforced rubber sheet, sealed with Belzona and held in place with steel strapping. A permanent repair will be made under work order MD 941402, when materials arrive. A written safety evaluation is in preparation to support operations of the 14 CFCU with the temporary repair. The inspector will review the evaluation report during a subsequent inspection (272/83-38-02).

No violations were identified.

8. Engineered Safety Feature (ESF) System Walkdown

The inspector(s) verified the operability of the selected ESF system by performing a walkdown of accessible portions of the system to confirm that system lineup procedures match plant drawings and the as-built configuration, to identify equipment conditions that might degrade performance, to determine that instrumentation is calibrated and functioning, and to verify that valves are properly positioned and locked as appropriate. The Unit 1 Emergency Diesel Generator Auxiliaries were selected. No violations were identified.

9. Operating Events

Unit 1

- On December 30, 1983, at 11:59 a.m. the reactor was shutdown to facilitate repairs to secondary side leaks in containment within the bioshield. Repairs were made to a hand hole cover on 14 Steam Generator and to a few valve packing leaks. The unit was restarted and was critical at 12:00 m. on December 31.
- The reactor tripped at 7:37 p.m. on December 31 from ~10% power due to a turbine trip on No. 13 Steam Generator high level. As a result of the post trip review of this event the licensee initiated an investigation to determine the preferred method of level control during startup and subsequently changed the feedwater pump operation procedure as noted in a later paragraph. The reactor was once again made critical at 11:08 p.m. on December 31.
- At 3:18 a.m. on January 1, 1984, the reactor tripped when the operator increased power above 10% with the turbine still tripped. The post trip review for this trip initiated another investigation into the preferred method of operation during turbine latching and synchronization with the choices being steam dump or water level control. As a result of the review the allowable time for operator manual trip backup of automatic trips will be changed from 300 cycles to a more realistic 1800 cycles in the post trip review procedure (30 seconds).
- Subsequent to the reactor trip, during testing of the Reactor Trip Breakers, the 1A Reactor Trip Bypass Breaker latch mechanism was found failed and laying on the breaker cubicle floor due to a broken cotter pin. The pin was replaced and the reactor was restarted. The licensee plans to specify a more durable stainless steel cotter pin than the one which failed in their procedures. The pin was previously unspecified by the vendor. The reactor was critical at 2:59 p.m. on January 1 and synchronized at 7:24 p.m. on January 1.
- At 8:00 a.m. on January 2, 1984, an operator discovered a high Reactor Vessel Flange Leakoff line temperature, indicating a primary leak. At first, it was assumed to be a failure of the RV flange outer seal since the inner seal had failed previously and was isolated. Power was reduced from 62% to 36% in preparation for a shutdown to make repairs. Since the leakage subsided and temperatures returned to ambient, the licensee decided to continue full power operations, while modifying the Reactor Vessel Flange leakoff piping arrangement to positively identify the source of the leakage. This modification showed that there was minor leakage from both the inner and outer seals on the order of 100 ml/min or less.

Based on discussions with Westinghouse, the licensee concluded that a catastrophic failure of the seals was extremely unlikely and that the worst case result would be steam cutting of the flange. In the past, Westinghouse has been successful in stoning out minor steam cuts and they have a procedure to weld repair more serious cuts if necessary. The licensee decided to follow the Westinghouse recommendation to operate with both seals unisolated to minimize damage to the flange. The leak rates from the seals have varied from 0 to about 100 ml/min depending on plant conditions and what appears to be periodic boron crystal plugging of the lines. Temperatures downstream of the seals have also varied from ambient of 55°F to about 210°F.

- At 11:42 p.m. on January 7, 1984, the plant tripped from 100% power on high high level in 14 Steam Generator (SG). Shortly after returning to full power following cleaning of the suction strainer on 11 Steam Generator Feed Pump (SGFP) the C feedwater heater string isolated and the condensate bypass valve failed to open. This caused a low suction pressure trip of 12 SGFP. While operators were reducing load, the steam stop valve on No. 14 SG shut and 11 SGFP overfed 14 SG resulting in the high level turbine trip and a reactor trip with the turbine tripped greater than 10% power. Following investigation of the event the reactor was taken critical at 4:37 p.m. on January 8.
- At 1:38 a.m. on January 10, 1984, the reactor tripped due to a turbine trip caused by high high level in No. 14 Steam Generator (SG) with reactor power greater than 10%. The high level in No. 14 SG was caused by a failure of the feedwater regulating valve (FRV) in the open position while latching the turbine. The licensee had just changed the procedure for feed pump operation to require that the FRVs be placed in auto when SG levels reach the programmed level during startup which occurred at 5% power. No. 13 SG FRV also cycled open but level reached only 54%. Nos. 11 and 12 FRVs controlled satisfactorily.

In spite of thorough troubleshooting efforts, the licensee was unable to identify the source of the spurious signal which caused two FRVs to cycle open and result in a trip during the startup. After SORC had reviewed the event and the FRV control circuits had been instrumented to pinpoint any future problems, the unit was taken critical at 4:07 a.m. on January 11 and the generator was synchronized to the grid at 8:27 a.m. without incident.

All of the events discussed in this paragraph were properly reported on the ENS line.

10. Offsite Review Committee

On December 6, 1983 the inspector attended regular Nuclear Review Board (NRB) meeting 83-15. Prior to the meeting the inspector reviewed the charter to ensure that it is consistent with the Technical Specification requirements. The most important issues discussed during the meeting included the role of the NRB with regard to the Action Plan developed after the Reactor Trip Breaker events, the quality of safety evaluations for design changes and the acceptability of the License Change Requests submitted for approval. The inspector will review the minutes of the meeting after they have been approved (311/83-37-04).

11. Nuclear Oversight Committee

On December 13, 1983 the inspector attended the first quarterly Nuclear Oversight Committee (NOC) meeting. At the outset of the meeting the chairman indicated that the role of the NOC is to help the licensee solve problems related to nuclear safety. He further stated that this type of committee appears to be a new concept and he encouraged anyone, including the NRC, to provide him with ideas to further define the role of the NOC. The most important issues discussed in the meeting were the Salem SALP performance, the Action Plan developed in response to the Reactor Trip Breaker incident, the development of Performance Indicators to measure safety and the Safety Review Process used by the licensee. The inspector will review the report of this meeting during a subsequent inspection (311/83-37-05).

12. Hydrogen Recombiner Cabinet Cable Penetrations

Based on a regional request the inspectors checked the Unit 2 Westinghouse Hydrogen Recombiners to see if the power cables were frayed where they go from the junction box into the recombinder cabinet due to the lack of a bushing as they had been at Susquehanna. The inspector found that the units inspected which are mounted on top of containment fan coil units, had no bushing where the cable goes from the junction box into the recombinder cabinet and that the power cable insulation was somewhat chafed, but that no conductor was exposed. The licensee did not consider the problem to be of sufficient magnitude to warrant immediate action, but did indicate that appropriate corrective action would be considered. The inspector will review this matter further during a subsequent inspection (311/83-37-06).

13. Exit Interview

At periodic intervals during the course of this inspection, meetings were held with senior facility management to discuss inspection scope and findings. On January 10, 1984, the inspector met with licensee representatives (denoted in paragraph 1) and summarized the scope and findings of the inspection as they are described in this report.