

U. S. NUCLEAR REGULATORY COMMISSION

REGION 1

Report Nos. 50-272/84-32
50-311/84-32

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 14 - September 24, 1984

Inspectors: *L. C. Linville*
J. C. Linville, Senior Resident Inspector

10/5/84
date

R. J. Summers
R. J. Summers, Resident Reactor Inspector

10/5/84
date

G. C. Smith
G. C. Smith, Inspector Safeguards Section

10/5/84
date

Approved By: *L. J. Norrholm*
L. J. Norrholm, Chief, Reactor Projects
Section No. 2B, Projects Branch No. 2, DPRP

10/9/84
date

Inspection Summary

Inspections on August 14 - September 24, 1984(Combined Report Numbers
50-272/84 -32 and 50-311/84-32)

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, ESF system walkdown, operating events, and allegation followup. The inspection involved 211 inspector hours by the resident NRC inspectors and 4 hours by one region based inspector.

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Results: There were two violations involving failure to follow radiation protection procedures for posting high radiation areas (paragraph 5) and failure to follow surveillance testing procedures for turbine stop and governor valves (paragraph 6). Other problems reviewed included spring packs and control circuitry for Limitorque operators (paragraph 4), placement of scaffolding near safety related equipment during plant operation (paragraph 5), adequacy of the boric acid transfer pump heat trace design (paragraph 2), the use of unqualified pressure gauges on the containment air locks (paragraph 9), stuck control rod 2B1 (paragraph 9), and two unit 2 trips due to feed pump overspeed sensor failure and condensate pump failure (paragraph 9).

DETAILS

1. Persons Contacted

Within this report period, interviews and discussions were conducted with members of licensee management and staff as necessary to support inspection activity.

2. Status of Previous Inspection Items

(Closed) Inspector Followup Item (311/82-26-03): This item involved recurrent reductions in service water flow to containment fan coil units due to silt buildup or oyster shell blockages. The licensee submitted revised LERs 311/82-04/03X-1 and 311/82-83/-03X-1 which described a program of cleaning the service water system during the last outage and continuous chlorination since then to prevent further oyster infestation. Inspection of the Unit 1 service water system during the current outage indicated that the chlorination program has been successful.

(Closed) Inspector Followup Item (311/84-23-02): This item involved a reactor trip caused by technician error while troubleshooting a problem with a steam generator level recorder. The inspector reviewed the licensee fact-finding report on this matter, the resulting shop letter to inform personnel of this problem, and the change to the troubleshooting procedure to enhance controls over this type of activity.

(Closed) Inspector Followup Item (272/84-08-03): This item involved a reactor trip caused by a failure of the condensate bypass valve to open on a heater string isolation which led to a low suction pressure trip on the steam generator feedwater pumps and low level in No. 13 steam generator. During the refueling outage, modification 1SC1171 which required the installation of a new condensate bypass valve (1CN47) was completed. This should prevent further binding problems.

3. Review of Periodic and Special Reports

Upon receipt, the inspectors 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 Reports for July and August 1984
- Unit 2 Monthly Operating Reports for July and August 1984
- Radioactive Effluent Release Report for January to June 1984

4. Licensee Event Report (LER) Review

The inspectors reviewed LER's to verify that the details of the events were clearly reported. The inspectors 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. Details of onsite followup are included, if applicable.

Unit 1

84-17 Foreign Material in Charging Pump Suction Lines.

This report details the failure of the No. 12 Charging/Safety Injection pump as a result of the introduction of foreign material in the form of resin and metal filings into the pump suction line. Had the redundant pump been in operation, it also could have been affected. Thus the event was potentially a common cause failure for both trains of ECCS. The rotating assembly of the affected pump was replaced and additional actions were taken to prevent recurrence. Both a Safety Evaluation and a Supplemental Report will be developed based on further investigation into the cause of the introduction of the foreign materials. The inspector will review the subsequent report when available (50-272/84-32-01).

84-18 , Inadvertent Safety Injection Signal.

This report details an inadvertent safety injection during surveillance testing as a result of technician error. The unit was in the refueling mode at the time and there was no injection into the reactor vessel due to system configurations in this mode of operation. The licensee's investigation into the event revealed no procedural inadequacy. The event was discussed with other department personnel to prevent similar errors.

Unit 2

84-18 Reactor Trip From 66% with Resultant Safety Injection.

This report describes a reactor trip and safety injection which occurred on July 25, 1984, when a no longer functional pressurizer low pressure overpressure protection (POPS) relief valve stuck open following testing of the POPS function of the power operated relief valve (2PR6) and closure of the block valve did not occur until primary pressure dropped below the safety injection setpoint. Initial inspector review of this event is documented in paragraph 9 of Inspection Report 50-311/84-27. Subsequent licensee investigation which involved thrust measurements on the Limitorque operator of the PWRV block valve indicated that when the operator was replaced during maintenance in April 1984, the replacement operator had a

different spring pack than the original operator and would therefore require a different torque switch setting to ensure valve closure under design differential pressure conditions. Inspector review of the procurement of this replacement operator indicated that, although it was purchased several years ago as a commercial catalog item, the replacement was required to be the same as the original operator as identified by serial number. Thus the licensee had no means of knowing that a spring pack change had been made by Limatorque and that a different torque switch setting would be required. The licensee changed the torque switch setting to assure valve closure of the PORV block valves based on the as-found torque measurements. In addition, the licensee was informed that Limatorque did not recommend reversing the travel of their operators while the valves are stroking because of the possibility of shearing the keyway on the pinion gear and the unaccounted for change in the required torque due to the increased coefficient of friction. The licensee had incorporated this capability to reverse direction during stroking in the controls for many Limatorque operators in both plants, even though the Limatorque manual does not recommend this configuration. The licensee modified the circuits of the PORV block valves to prevent a reversal in direction while stroking, and provided procedural guidance to operators in less critical applications. The undocumented change in spring pack and the reversal of direction of Limatorque operators while stroking are unresolved items pending licensee resolution of these issues with Limatorque (50-311/84-32-01).

84-19 Both Containment Spray Systems Inoperable in Mode 4.

This report details the inadvertent premature tagout of both containment spray pumps when they were required to be operable in Mode 4 for 2 hours and 54 minutes. Initial inspector review of this licensee identified event is described in paragraph 9 of Inspection Report 50-311/84-27. The inspector subsequently reviewed the detailed description of this event provided in the Operations Department Newsletter, which is required reading for all operations department personnel.

84-20 Component Cooling System - Missed Surveillance.

This report described a missed surveillance test on a normally locked component cooling water system valve which was found unlocked due to inconsistency between operating procedures associated with manipulation of the valve. The licensee will change the procedures to prevent recurrence. The inspector will review these changes during a subsequent inspection (311/84-32-02).

5. Operational Safety Verification

a. Control Room Observations

Daily, the inspectors 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 inspectors observed shift turnovers biweekly to ensure proper control room and shift manning. The inspectors 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 inspectors made observations and conducted tours of the plant. During the plant tours, the inspectors 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 inspectors also checked fire protection, housekeeping/cleanliness, radiation protection, and physical security conditions to ensure compliance with plant procedures and regulatory requirements.

During tours of Unit 1 prior to startup following the extended modification and refueling outage, the inspector observed that excessive scaffolding remained in place throughout safety related areas of the plant, but particularly in the electrical penetration area. It appeared that movement of this unsecured scaffolding during a seismic event could jeopardize the operability of safety related equipment in both electrical trains because of close proximity of the scaffolding to cable trays and switchgear. When the inspector brought this concern to the licensee's attention, the licensee stated that all scaffolding in both plants would be removed by September 14 or its placement would be justified by a safety evaluation. The inspector will review the resolution of this issue during a subsequent inspection (50-272/84-32-02).

During a tour of the Unit 1 Auxiliary Building on September 6, 1984, two people were observed working in an area that had been posted as a high radiation area. The suction line for the ECCS pumps from the RWST had some internal contamination that caused a high radiation field. The pipe is located in the overhead area of the corridor on the 84 foot elevation. Since there was a potential for changing dose rates, the length of the pipe was posted for this condition and in addition, the corridor was posted to identify the high radiation area in the overhead and to require no loitering in the area. The two

individuals, in the area on Extended Radiation Exposure Permit (EREP) 9906, had used a scaffold to gain access to the cable tray immediately below the RWST pipe to make repairs to the cable tray fire wrap. Since the area was posted as a high radiation area, no entry should have been made without additional radiological controls. It did not appear that the workers were aware of the condition, even though there was adequate posting of the area, nor that the work party supervisor had discussed the work activity with the radiation protection department to determine if the conditions warranted additional controls. Generally, EREPs preclude entry into contaminated or high radiation areas. However, the requirements for EREP 9906 at that time stated that it be used for "clean areas only". The licensee subsequently changed the EREP 9906 requirements to also prevent high radiation area entry. Since the two individuals remained in the area contrary to the posting requirements, this is a violation of AP 24 radiation protection program and Technical Specification 6.11 (272/84-32-03).

6. Surveillance Observations

The inspectors 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:

- 100% Calorimetric calculation on Unit 2 per the Reactor Engineering Manual, Part 2
- Turbine Overspeed Protection testing on Unit 2 per SP(0)4.3.4.2
- Rod drop time measurements - hot full flow on Unit 1 per 1PD - 5.2.001
- Electrical Power System - Diesel Generator testing on Unit 2 per SP(0) 4.8.1.1.2
- Channel Calibration Check 2PT-456, Pressurizer Pressure Protection Channel II per 2PD 2.2.018

While observing turbine governor and stop valve testing of Unit 2 on September 4, 1984, the inspector observed that Nos. 22 and 23 stop and governor valves did not cycle open as designed when the button on the electro-hydraulic control panel was released. In order to reopen the valves, the operators had to manually bleed air pressure from the solenoids with a key and force the solenoid plunger open with a short piece of broom handle apparently routinely used for this purpose. The surveillance procedure SP(0) 4.3.4.3, and the referenced operating procedure, OI III-1.3.3, did not specifically permit this method of stroking the valves, no note of the discrepancy was made in the surveillance procedure or any logs, and no work order was written to correct the discrepancy as required by AP 12, Technical Specification

Surveillance Program. Failure to implement written procedures for surveillance and test activities of safety related equipment is a violation of Technical Specification 6.8.1 (311/84-32-03). In addition, the same problem led to a reactor trip on April 24, 1984 due to steam flow-feedwater flow mismatch when the valves were opened by this method as reported in LER 311/84-12. While this method of valve opening had no safety significance with respect to the performance of this surveillance test which demonstrates the ability of the valves to close, it could lead to additional unnecessary safety system challenges like the one reported in LER 84-12 if left uncorrected.

7. Maintenance Observations

- a. The inspectors 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 12 auxiliary feedwater pump motor per W.O. No. 0099 00209-4
 - Troubleshooting 21 Boric acid transfer (BAT) pump vital heat tracing per W.O. No. 9909881
 - Repairs to the No. 2B1 control rod guide tube

The BAT pump vital heat tracing problem appears to involve more than the controller. At the time the work activity was observed, the primary controller had failed and the secondary circuit could not maintain temperature above an indicated 140 degree F. Due to the placement of the respective thermocouples, it was not clear what the actual temperature was. However, there was flow through the system. The heat trace consists of two strip heaters providing radiant heating to the pump. Since no insulation is provided, there is a large heat loss to ambient. The fact that the secondary circuit could not maintain proper temperature could have resulted in a loss of this flow path. Since there appears to be a design problem with the heat tracing for the BAT pumps, this matter is considered unresolved pending licensee evaluation of the design adequacy for both temperature control and indication (311/84-32-04).

8. Engineered Safety Feature (ESF) System Walkdown

The inspectors verified the operability of the selected ESF systems 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. Unit 1 containment spray and high head safety injection systems were inspected.

9. Operating Events

A. Unit 1

At 4:30 p.m. on August 23, 1984, the licensee made a non-emergency one-hour event report that the containments were degraded due to the use of unqualified gauges on the containment personnel air locks. The gauges had been removed and the lines capped on August 22 when the qualification of the gauges was questioned. The gauges were part of the original design provided by Chicago Bridge and Iron (CB&I). Although the gauges do not appear to be part of the CB&I standard air lock design, there is still a possibility of generic implications because the air line used to pressurize between the door seals for testing is also involved. Subsequently, the license modified the design change to reconnect the air test line to the air lock with qualified equipment. Some questions remain regarding the normal position of the valves associated with the air test line. The inspector will review this matter further when the LER is submitted.

While performing rod drop testing in Mode 3 at 7:56 a.m. on September 9, 1984, rod 2B1 stuck at about 200 steps. The rod was subsequently driven in to 120 steps and dropped. When a second attempt was made the rod stuck again at about 200 steps, and was subsequently driven to the fully inserted position. Rod 1B2 also stuck on the first attempt at a drop test, but tested satisfactorily on the second attempt. The symptoms appeared very similar to the problem experienced recently at Trojan following the split pin replacement by Westinghouse. The licensee decided to cool the unit down, remove the vessel head, investigate, and repair the condition which was causing control rod 2B1 to bind during withdrawal and fail its drop tests. The investigation determined that the control rod guide tube top hat was cocked. This caused the binding of the control rod. The condition was due to 90 degree rotation of the guide tube extension from its normal position during reassembly after the split pin replacement. This prevented the two alignment guide pins from engaging properly on the upper guide tube assembly and caused the assembly to cock when the four threaded fasteners were torqued. Westinghouse inspected all of the other top hats and identified minor misalignment on assembly 2D2. There was no

binding of this control rod apparent during the functional testing that revealed the problem with 2B1. Both top hats were rotated to the proper position without any movement of fuel or control rods. Following the repairs on September 20, 1984, the licensee attempted to reassemble the reactor vessel. While placing the vessel head, a core exit thermocouple (CET) guide tube failed to properly engage and was bent. The head was removed. The licensee, with Westinghouse assistance, was able to straighten the tube. This is the second time a CET guide tube was bent during head placement this refueling outage. Following repairs, the licensee successfully replaced the vessel head.

B. Unit 2

On August 26, 1984, the unit tripped from 100% power at 5:11 p.m. The cause of the trip was a low low level in No. 24 steam generator due to No. 21 steam generator feedpump trip on overspeed. The overspeed trip was a result of speed sensor instrument failure. All other equipment responded normally following the trip. Following repairs to the feedpump on August 27, the reactor was made critical at 4:33 a.m. and the unit was synchronized at 8:08 a.m. After another failure on September 4 the licensee determined that the speed sensors had failed because the bracket holding them in place was loose, thus permitting the probe to move such that the speed gear contacted and damaged the overspeed probe. This movement also caused speed control problems which required that the pump be removed from service prior to the reactor trip on September 5. The inspector will review this event further when the LER is submitted.

At 3:11 a.m. on September 5, 1984, the unit tripped from 54% power due to low level in No. 24 steam generator and low feedwater flow caused by the trip of the only operating steam generator feedwater pump (SGFP). The other SGFP was out of service to repair speed control problems experienced earlier as noted above. Licensee investigation concluded that the SGFP tripped during erratic oscillations in speed caused by the introduction of air into the condensate system when the shaft on No. 22 condensate pump sheared. All other equipment performed as expected following the trip. At 1:20 a.m. on September 7, the licensee made the reactor critical, but power ascension was delayed while testing Nos. 21 and 22 SGFPs. At 4:44 p.m. on September 7, the unit was synchronized to the grid and power was increased to 75%. Power was limited to 75% until No. 21 condensate pump was repaired on September 13, 1984. The inspector will review this event further when the LER is submitted.

10. Allegation Followup

As a result of allegations received in Region I on September 20, 1984, relative to irregularities in the security program, a regional security inspector was dispatched to the site. Through review of documentation, and interviews with licensee and contract security management, the inspector determined that the licensee was in compliance with regulatory requirements and that the allegations were not substantiated.

11. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. The unresolved items identified during this inspection are discussed in paragraphs 4 and 7.

12. 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 September 24, 1984, the inspectors met with licensee representatives and summarized the scope and findings of the inspection as they are described in this report.