

January 19, 2001

Mr. Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear Limited Liability Company
Post Office Box 236
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION - NRC INSPECTION REPORT
05000272/2000-010, 05000311/2000-010

Dear Mr. Keiser:

On December 30, 2000, the NRC completed an inspection of your Salem Units 1 and 2 reactor facilities. The enclosed report documents the preliminary inspection findings which were discussed on January 4, 2001, with PSEG Nuclear management led by Mr. David Garchow of your staff.

This inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, the inspectors identified one issue of very low safety significance (Green) related to the misalignment of a breaker and the subsequent failure to start of its service water pump. This issue was determined to involve a violation of NRC requirements. However, because of its very low safety significance and because it has been entered into your corrective action program, the NRC is treating this issue as a non-cited violation, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny this non-cited violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at the Salem facility.

Mr. Harold W. Keiser

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Sincerely,

/RA/

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

Docket No.: 05000272, 05000311
License No.: DPR-70, DPR-75

Enclosure: Inspection Report 05000272/2000-010, 05000311/2000-010

cc w/encl:

E. Simpson, Senior Vice President and Chief Administrative Officer
M. Bezilla, Vice President - Technical Support
D. Garchow, Vice President - Operations
G. Salamon, Manager - Licensing
R. Kankus, Joint Owner Affairs
J. J. Keenan, Esquire
Consumer Advocate, Office of Consumer Advocate
F. Pompper, Chief of Police and Emergency Management Coordinator
M. Wetterhahn, Esquire
State of New Jersey
State of Delaware

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos: 05000272, 05000311
License Nos: DPR-70, DPR-75

Report No: 05000272/2000-010, 05000311/2000-010

Licensee: PSEG Nuclear LLC

Facility: Salem Nuclear Generating Station, Units 1 & 2

Location: P.O. Box 236
Hancocks Bridge, NJ 08038

Dates: November 12 - December 30, 2000

Inspectors: Glenn T. Dentel, Acting Senior Resident Inspector
F. Jeff Laughlin, Resident Inspector
Joseph T. Furia, Senior Radiation Specialist
Richard S. Barkley, Senior Project Engineer
Christopher G. Cahill, Resident Inspector - Hope Creek

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

Summary of Findings

IR 05000272-00-10, IR 05000311-00-10, on (11/12 - 12/30/2000), Public Service Electric Gas Nuclear LLC, Units 1 and 2. Maintenance Rule Implementation.

The inspection was conducted by resident inspectors, a regional radiation specialist, and a regional projects inspector. This inspection identified one green finding, which was a non-cited violation. The significance of the finding is indicated by its color (Green, White, Yellow, or Red) using IMC 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply are indicated by "no color" or by the severity level of the applicable violation.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- GREEN. Operators failed to properly align the breaker for a Unit 1 service water pump following maintenance. This resulted in the pump failing to start approximately 11 days after being returned to service. Also, the corrective action investigation was not thorough and did not recognize that the pump may have been inoperable for these 11 days. The failure to properly align the breaker was a non-cited violation.

The finding was of very low safety significance because redundant mitigating equipment was available during the periods when the pump was unavailable. (Section 1R12)

B. Licensee Identified Findings

The inspector reviewed a violation of very low significance which was identified by PSEG Nuclear related to six instances of inadequate radiological posting and barricades. PSEG Nuclear's corrective actions, taken or planned, appeared reasonable. This violation is listed in section 40A7 of this report.

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Report Details

SUMMARY OF PLANT STATUS

Unit 1 began the period at 100%. On December 8, 2000, Unit 1 tripped automatically due to low level in the 13 steam generator caused by a circuit card failure induced feedwater isolation (see Section 4AO3). Operators completed the unit restart and the turbine was synchronized to the off-site power grid on December 10. The unit reached full power on December 11 and remained at or near full power through the end of the inspection period.

Unit 2 began the period in Mode 3 in preparation for reactor start-up following the eleventh refueling outage (2R11). Operators started up the Unit 2 reactor on November 14, and the turbine was synchronized to the off-site power grid on November 15, marking the end of a 40 day refueling outage. The unit reached full power on November 19 and remained at or near full power through the end of the inspection period.

1. REACTOR SAFETY (Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity)

R01 Adverse Weather Protection

a. Inspection Scope

The inspectors reviewed procedures SC.OP-PT.ZZ-0002(Z), Rev 2, *Station Preparations For Winter Conditions*, and SC.MD-GP.ZZ-0178(Q), Rev 6, *Station Preparations For Winter - Electrical*, to verify that adequate actions had been taken to protect mitigating systems from freezing weather conditions. They also interviewed system managers responsible for risk-significant systems with water storage tanks outside (refueling water and auxiliary feedwater storage tanks) which would be susceptible to freezing. Additionally, the inspectors performed a detailed walkdown of these tanks, and provided feedback to operations and maintenance management personnel concerning numerous minor deficiencies, documented in corrective action system notifications 20051063 and 20051066.

b. Issues and Findings

No findings of significance were identified.

R04 Equipment Alignment

a. Inspection Scope

The inspectors performed a partial system walkdown of the Unit 1 C emergency diesel generator (EDG) while the Unit 1 B EDG was out of service for routine maintenance. The inspectors verified system alignment, including service water supply valves, and examined material condition of major equipment.

b. Issues and Findings

No findings of significance were identified.

R05 Fire Protection

a. Inspection Scope

The inspectors reviewed the fire protection analyses for both units and identified the following risk significant areas:

- Unit 1 control room
- Unit 1 4160 V switchgear room
- Unit 2 460 V switchgear room
- Unit 2 relay room

The inspectors performed in-plant walkdowns of the above listed areas. Specific fire protection conditions examined included control of transient combustibles, material condition of fire protection equipment, and the adequacy of any fire impairments and compensatory measures. Minor deficiencies were reported to the station fire protection engineer who initiated appropriate corrective actions.

The inspectors observed a fire drill in the Unit 1 4160 switchgear room. The inspectors verified the availability and proper use of fire fighting equipment and the communication effectiveness within the fire brigade. The inspectors attended the critique and confirmed that corrective actions to a drill deficiency were implemented.

b. Issues and Findings

No findings of significance were identified.

R12 Maintenance Rule Implementation

.1 Salem Gas Generator

a. Inspection Scope

The inspectors evaluated maintenance rule (MR) implementation for the Salem station gas generator. The inspectors reviewed the adequacy of the goals established for this (a)(1) system, the appropriateness of corrective actions taken and planned to improve reliability, and the effectiveness in balancing the availability and reliability of the system.

b. Issues and Findings

No findings of significance were identified.

.2 Unit 1 Service Water Pump Failure to Start

a. Inspection Scope

The inspectors reviewed the October 2 failure of the Unit 1 16 service water (SW) pump 4KV breaker to close when operators attempted to start the pump. The inspectors examined the following: 1) the overall risk significance of the failure; 2) the evaluation of the cause and the adequacy of corrective actions; and 3) the maintenance rule evaluation of the failure as a functional failure and for maintenance rule unavailability. The inspectors evaluated the event after the cause and corrective actions were determined. The following documents were reviewed.

- SC.OP-SO.4KV-0001(Q), *4KV Breaker Operation*, Rev. 17
- S1.OP-SO.SW-0001(Q), *Service Water Pump Operation*, Rev. 14
- S1.OP-SO.SW-0002(Q), *11 Nuclear Service Water Header Outage*, Rev. 14
- Notification 20041802, *16 service water pump failed to start manually*
- Control Room Narrative Logs from September 20 to October 2

b. Issues and Findings

The 16 SW pump failed to start due to operators failing to ensure proper breaker alignment following maintenance. Also, the corrective action investigation was not thorough and did not recognize that the pump may have been inoperable for approximately 11 days.

On September 21 the 16 service water pump was returned to service following routine breaker changeout. PSEG Nuclear personnel performed various preventive maintenance items to the new breaker and installed a design change to address a previous problem. Operators racked in the breaker using procedure SC.OP-SO.4KV-0001(Q) and started the pump to prove operability. Operators shut down the pump after a four hour run. The pump remained in the standby condition until October 2 when the breaker failed to close and the pump did not start.

The 4KV system manager determined the apparent cause to be failure of the operator to identify that the new breaker was not properly aligned as specified in the maintenance instructions. The inspectors identified two weaknesses in the evaluation. The system manager did not know the chronology of the event and believed that the breaker had just been returned to service following maintenance. In addition, the as-found condition of the breaker following failure of the breaker to close was not captured. The two weaknesses represented a review which was not thorough and involved the 1) failure to recognize the significance of the event and evaluate the impact on maintenance unavailability hours for the service water system; 2) inability to confirm the cause of the event; and 3) inability to conduct timely interviews for individuals associated with the breaker alignment on September 21. The additional unavailability hours did not result in the service water system exceeding maintenance rule (a)(1) goals. The failure to start was properly assessed as a maintenance preventable functional failure.

The system manager, aware of the new information on the chronology of the event, determined that the original apparent cause was still applicable. The manager postulated that although the breaker performed properly on September 21, the misalignment manifested itself as a problem when the pump was shut down on September 21 or during another adjacent breaker closure before October 2. The misalignment, combined with the other effects on the breaker, resulted in a contact being open in the circuit that prevented the breaker from closing. Therefore, the pump may have been inoperable for approximately 11 days.

The inspectors concluded that the apparent cause was adequate based on the available information. Corrective actions addressed the apparent cause and extent of condition.

The failure to have the breaker properly aligned resulted in a service water pump failing to start. This finding, if left uncorrected, would become a more significant concern and could credibly affect the availability of a train in a mitigating system. However, the breakers for the other five service water pumps were inspected and were not misaligned. These redundant service water pumps were available to provide sufficient flow to safely cool down the reactor. Therefore, the finding was considered to be of very low safety significance (Green). The inspectors concluded that misalignment resulted from a failure to properly implement procedure SC.OP-SO.4KV-0001(Q). Failure to properly implement this procedure was a violation of TS 6.8.1 which requires that procedures be established and implemented covering the activities described in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. This procedure violation is being treated as a non-cited violation (**NCV 05000272/2000-010-01**) due to the very low safety significance of the item and because PSEG Nuclear has included this item in their corrective action program (Notification 20041802).

R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed operability evaluations in order to determine that proper operability justifications were performed for the following items. In addition, where a component was determined to be inoperable, the inspectors verified the TS limiting condition for operation implications were properly addressed.

- On November 19 Unit 1 operators determined that the 11 charging pump failed the bio-fouling acceptance criteria in S1.OP-PT.SW-0004(Q), *Service Water Biofouling Monitoring Safety Injection and Charging Pumps*. The inspectors evaluated the immediate operator actions and the system engineer's long term trending of the bio-fouling for the charging pump's lube oil and gear oil coolers. The inspectors also examined the operability impact of the bio-fouling condition based on actual conditions of the plant and the river.
- The MS46 valves (two per unit) are the steam supply check valves for the turbine driven AFW pumps and are designed to close to prevent reverse flow during an upstream steam line break. Following the December 8 Unit 1 reactor trip, the 11MS46 failed to close. Following a December 9 surveillance test of the 23

auxiliary feedwater (AFW) pump the 23MS46 failed to close. The inspectors assessed immediate operator actions, interviewed engineering personnel, and reviewed engineering documentation associated with these valve failures, which were documented in corrective action program notifications 20049656 and 20049716.

b. Issues and Findings

No findings of significance were identified.

R19 Post Maintenance Testing

a. Inspection Scope

The inspectors observed portions of the post-maintenance testing (PMT) activities and reviewed PMT data following planned work on the 12 diesel fuel oil transfer pump on December 20 and 21. The inspectors verified that the test data met the appropriate acceptance criteria. They also discussed minor work package deficiencies with operations and maintenance personnel, which were documented in corrective action program notification 20051223.

b. Issues and Findings

No findings of significance were identified.

R22 Surveillance Testing

a. Inspection Scope

The inspectors observed and reviewed the following surveillance tests concentrating on the adequacy of the test to demonstrate system operability. The inspectors verified the proper trending and evaluation of inservice testing data.

- S1.OP-ST.Cs-0001(Q), *Inservice Testing - 11 Containment Spray Pump*, Rev. 10.
- S1.OP-ST.CBV-0003(Q), *Containment Systems - Cooling Systems*, Rev. 11.
- S2.OP-ST.MS-0002(Q), *Inservice Testing Main Steam and Main Feedwater Valves*, Rev. 13, for the 22BF22 stop check valve.

b. Issues and Findings

No findings of significance were identified.

2. RADIATION SAFETY

Occupation Radiation Safety [OS]

OS1 Access Control

a. Inspection Scope

The inspectors reviewed the access control program (as required under Plant Technical Specifications and 10 CFR 20.1601) by examining the controls established for exposure significant areas, including postings, markings, control of access, dosimetry, surveys and alarm set points. Controls reviewed included: key control for locked high radiation areas; radiation work permits to control access to radiologically significant areas; and pre-job radiological briefings. The inspectors also reviewed records of the controls utilized during the change-out of the Unit 2 chemistry and volume control letdown filter during the outage, which had a contact dose rate of 1500 rad per hour. The inspectors observed the transfer of a liner of spent resins having dose rates in excess of 100 millirem per hour from the Salem radwaste processing area to the low level radwaste storage facility.

The inspectors reviewed self-assessments performed during the Unit 2 refueling outage (2R11), including those performed by members of the radiation protection and quality assurance staffs. Assessments reviewed included "Focused Self-Assessment Report: Use of Electronic Dosimetry Alarms by RP Personnel," and QA Assessment Monitoring Feedbacks Nos. 2000-0433 (RCS Filter Change-out During 2R11); 2000-0452 (Access Control to Radiation Areas); 2000-0459 (Radiation Protection Departmental Oversight); and 2000-0472 (2R11 Personnel Contamination Events).

The inspectors reviewed recent notifications for radiological issues related to control of access to radiologically significant areas. The review focused on observable patterns traceable to similar causes. Notification Nos. 20040598, 20041326, 20041330, 20042420, 20044134, and 20045611 documented instances of improper access and/or control of high radiation areas.

b. Issues and Findings

No findings of significance were identified.

OS2 ALARA Planning and Controls

a. Inspection Scope

The inspectors reviewed work performance during 2R11 to ensure that 10 CFR 20.1101(b) was being properly implemented. The inspectors evaluated engineering controls to achieve dose reductions, use of low dose waiting areas, on-job supervision provided to workers, and individual exposures from selected work groups. The inspectors also reviewed the analysis of the source term reduction plans.

For 2R11 the original outage exposure goal had been established at 80 person-rem. Following problems during the start of the outage with crud burst control (documented in NRC Inspection Report 05000272; 05000311/2000-009), the outage goal was revised upwards to 160 person-rem. At the conclusion of the outage, collective exposures totaled 187 person-rem. The inspectors discussed with PSEG Nuclear personnel the causes for this exposure increase, and reviewed outage documentation related to exposure control, including a report issued by the Salem ALARA Supervisor (Exposure Impact Statement for 2R11). The inspectors also reviewed four notifications written to document the causes of the additional outage exposure. These notifications were Nos. 20047173 (Extra CRUD Burst Causes Unexpected Dose); 20042531 (H2 in RCS after chem degassing); 20042886 (DCP jeopardizes 2R11 Outage Dose Goals); and, 20045136 (Mid loop level indication failed low).

The inspectors also reviewed a self-assessment performed during 2R11 related to the ALARA program (Focused Self-Assessment Report: Exposure Impact 2R11).

b. Issues and Findings

No findings of significance were identified.

OS3 Radiation Monitoring Instrumentation

a. Inspection Scope

The inspectors reviewed field instrumentation used by health physics technicians and plant workers to measure radioactivity, including portable field survey instruments, friskers, portal monitors and small article monitors. The inspectors reviewed instruments used in the auxiliary and fuel handling buildings, specifically verification of proper function and certification of appropriate source checks for these instruments which ensure that occupational exposures are maintained in accordance with 10 CFR 20.1201.

b. Issues and Findings

No findings of significance were identified.

4. OTHER ACTIVITIES [OA]

OA3 Event Follow-up

Unit 1 Reactor Trip

a. Inspection Scope

On December 8 Unit 1 experienced an automatic reactor trip due to an inadvertent feedwater isolation and the resultant low level in the 13 steam generator. The inspectors responded to the control room and independently evaluated the circumstances surrounding the trip, including operator and equipment performance.

The inspectors reviewed selected equipment issues that occurred during and following the shutdown.

The inspectors observed portions of troubleshooting efforts to establish the cause of the reactor trip. Maintenance technicians determined that the low steam generator level was initiated by a defective circuit card (A517) in the solid state protection system which provides a feed water isolation safety signal. Upon failure this card improperly initiated the closure of the feedwater regulating valves, which resulted in the low steam generator level. The inspectors evaluated whether immediate corrective actions addressed the cause of the trip prior to the unit restarting on December 10.

b. Issues and Findings

No findings of significance were identified.

OA5 Other

INPO Evaluation Report Review

The inspectors reviewed the Institute for Nuclear Power Operations (INPO) Interim Report for the INPO evaluation of Salem and Hope Creek Generating Stations conducted September 11-22, 2000.

OA6 Management Meetings

Exit Meeting Summary

On January 4, 2001, the inspectors presented their overall findings to members of PSEG Nuclear management led by Mr. David Garchow. PSEG Nuclear management acknowledged the findings presented and did not contest any of the inspectors' conclusions. Additionally, they stated that none of the information reviewed by the inspectors was considered proprietary.

OA7 Licensee Identified Non-Compliance

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

NCV 05000272; 05000311/2000-010-002 Plant Technical Specification 6.12 for both units sets forth the requirements for the posting, barricading and control of access to high radiation areas (dose rates in excess of 100 millirem per hour measured at 30 centimeters from the source of radiation). Improper posting and barricades were identified by PSEG Nuclear in six instances during 2000, as described in their corrective action program, Notification Nos. 20040598, 20041326, 20041330, 20042420, 20044134, and 20045611.

SUPPLEMENTAL INFORMATION

a. Key Points of Contact

T. Cellmer, Radiation Protection Manager
 R. Gary, Support Superintendent
 M. Hassler, Radiation Protection Operations Superintendent - Salem
 S. Jones, Maintenance Team #3 Department Lead
 S. Mannon, System Engineering Manager
 T. Neufang, ALARA Superintendent
 K. O'Hare, ALARA Superintendent
 J. Robertson, Operations Manager
 G. Salamon, Licensing Manager
 B. Sebastian, Radiation Protection Operations Superintendent - Hope Creek
 F. Soens, Assistant Operations Manager
 L. Wagner, Work Management Department Lead

b. List of Items Opened/Closed

Opened/Closed

05000272/2000-010-001	NCV	Failure to properly align the breaker for a Unit 1 service water pump. (Section 1R12)
05000272; 05000311/2000-010-02	NCV	Improper posting and barricades were identified by the licensee in six instances during 2000. (Section 4OA7)

c. List of Documents Reviewed

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

12 Diesel Fuel Oil Transfer Pump - Inspect (Work Order 50003483)
 12 Fuel Oil Transfer System Operability Test (S1.OP-ST.DG-0005(Q), Revision 19)

d. List of Acronyms

AFW	Auxiliary Feedwater
ALARA	As Low As Is Reasonably Achievable
EDG	Emergency Diesel Generator
INPO	Institute For Nuclear Power Operations
MR	Maintenance Rule
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PMT	Post Maintenance Testing
PSEG	Public Service Electric Gas
QA	Quality Assurance
SDP	Significance Determination Process
SW	Service Water
TS	Technical Specification

ATTACHMENT 1

NRC's REVISED REACTOR OVERSIGHT PROCESS

The federal Nuclear Regulatory Commission (NRC) recently revamped its inspection, assessment, and enforcement programs for commercial nuclear power plants. The new process takes into account improvements in the performance of the nuclear industry over the past 25 years and improved approaches of inspecting and assessing safety performance at NRC licensed plants.

The new process monitors licensee performance in three broad areas (called strategic performance areas): reactor safety (avoiding accidents and reducing the consequences of accidents if they occur), radiation safety (protecting plant employees and the public during routine operations), and safeguards (protecting the plant against sabotage or other security threats). The process focuses on licensee performance within each of seven cornerstones of safety in the three areas:

Reactor Safety

- Initiating Events
- Mitigating Systems
- Barrier Integrity
- Emergency Preparedness

Radiation Safety

- Occupational
- Public

Safeguards

- Physical Protection

To monitor these seven cornerstones of safety, the NRC uses two processes that generate information about the safety significance of plant operations: inspections and performance indicators. Inspection findings will be evaluated according to their potential significance for safety, using the Significance Determination Process, and assigned colors of GREEN, WHITE, YELLOW or RED. GREEN findings are indicative of issues that, while they may not be desirable, represent very low safety significance. WHITE findings indicate issues that are of low to moderate safety significance. YELLOW findings are issues that are of substantial safety significance. RED findings represent issues that are of high safety significance with a significant reduction in safety margin.

Performance indicator data will be compared to established criteria for measuring licensee performance in terms of potential safety. Based on prescribed thresholds, the indicators will be classified by color representing varying levels of performance and incremental degradation in safety: GREEN, WHITE, YELLOW, and RED. GREEN indicators represent performance at a level requiring no additional NRC oversight beyond the baseline inspections. WHITE corresponds to performance that may result in increased NRC oversight. YELLOW represents performance that minimally reduces safety margin and requires even more NRC oversight. And RED indicates performance that represents a significant reduction in safety margin but still provides adequate protection to public health and safety.

The assessment process integrates performance indicators and inspection so the agency can reach objective conclusions regarding overall plant performance. The agency will use an Action Matrix to determine in a systematic, predictable manner which regulatory actions should be

taken based on a licensee's performance. The NRC's actions in response to the significance (as represented by the color) of issues will be the same for performance indicators as for inspection findings. As a licensee's safety performance degrades, the NRC will take more and increasingly significant action, which can include shutting down a plant, as described in the Action Matrix.

More information can be found at: <http://www.nrc.gov/NRR/OVERSIGHT/index.html>.