February 14, 2000

EA 2000-018

Mr. Harold W. Keiser
President and Chief Nuclear Officer
PSEG Nuclear LLC
Post Office Box 236
Hancocks Bridge, New Jersey 08038

SUBJECT: NRC INSPECTION REPORT 05000272/1999010, 05000311/1999010;
FINAL SIGNIFICANCE DETERMINATION AND NOTICE OF VIOLATION

Dear Mr. Keiser:

On December 7, 1999, the NRC completed an inspection of your Salem 1 & 2 reactor facilities. The enclosed report presents the results of that inspection. Preliminary findings were presented to PSEG Nuclear management led by Mr. D. Garchow in a debrief on November 19, 1999, and by Mr. F. Sullivan in an exit meeting on December 9, 1999. Following review of the preliminary findings by the Significance Determination Process (SDP) panel (January 21, 2000), a re-exit was held by telephone on February 7, 2000, to inform your staff of changes to the preliminary inspection findings.

One inspection finding was assessed using the applicable SDP and was determined to be White, (i.e., an issue with some increased importance to safety, which may require additional NRC inspections). This White finding involved the failure of the Unit 2 4160Vac switchgear room carbon dioxide fire suppression system to achieve the minimum fifty percent concentration when it was originally installed and tested. When using the SDP we determined the finding to be White based on determining that the one hour raceway fire barrier system in the 4160Vac switchgear room was also degraded. The determination is further described in the inspection report in Section 1RO5.2. In a telephone conversation with Mr. W. Ruland of NRC, Region I, on February 11, 2000, Mr. F. Sullivan of your staff indicated that PSEG did not contest the characterization of the risk significance of this finding.

The failure of the carbon dioxide fire suppression system to meet the concentration requirements is a violation of your fire protection license condition, as described in the attached Notice of Violation (Notice). This violation is being cited in accordance with the Interim Enforcement Policy for Use During the NRC Power Reactor Oversight Process Pilot Plant Study, as described in NUREG 1600, because it is associated with a white finding.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

Because plant performance for this issue has been determined to be in the increased regulatory response band, we will use the NRC Action Matrix, as described in SECY-99-007A, "Recommendations for Reactor Oversight Process Improvements," to determine the most appropriate NRC response for this event. We will notify you, by separate correspondence, of that determination.

In addition, we identified several violations of NRC requirements in the protection of alternate shutdown equipment, and fixed suppression systems for the electrical penetration rooms. These findings were evaluated using the applicable SDP and were determined to be Green, (i.e., the risk associated with these issues remains within the acceptable range). These violations are being treated as non-cited violations (NCVs), consistent with the interim Enforcement Policy for pilot plants. These NCVs are described in the subject inspection report and have been entered into your corrective action program. If you contest the nature or severity level of any of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region I, the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001, and the Salem resident inspectors.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Sincerely,

/RA/

Wayne D. Lanning, Director
Division of Reactor Safety

Docket Nos. 05000272; 05000311
License Nos. DPR-70; DPR-75

Enclosures: Notice of Violation
Inspection Report 05000272/1999010, 05000311/1999010

cc w/encl:
L. Storz, Senior Vice President - Nuclear Operations
E. Simpson, Senior Vice President and Chief Administrative Officer
M. Bezilla, Vice President - Nuclear Operations
D. Garchow, Vice President - Technical Support
M. Trum, Vice President - Maintenance
T. O'Connor, Vice President - Plant Support
E. Salowitz, Director - Nuclear Business Support
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A. Kirby, III, External Operations - Nuclear, Connective Energy
J. McMahon, Director - QA/Nuclear Training/Emergency Preparedness
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W. Conklin, Public Safety Consultant, Lower Alloways Creek Township
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B. August

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NOTICE OF VIOLATION

PSEG Nuclear LLC
Salem Nuclear Generating Station

Docket No. 05000311
License No. DPR-75
EA-00-18

During an NRC inspection conducted on November 15 - 19, 1999, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

> License Condition 2.C.10 for Unit 2 requires PSEG to maintain in effect all provisions of the approved fire protection program, as described in the Safety Evaluation Report issued November 20, 1979, and subsequent safety evaluation reports. Section II.C of the November 20, 1979, Safety Evaluation Report states that the carbon dioxide gaseous suppression systems will be designed in accordance with NFPA Standards Numbers 12 and 12A.
>
> National Fire Protection Association Standard on Carbon Dioxide Extinguishing Systems (NFPA 12), Section 2-4, Carbon Dioxide Requirements for Deep-seated Fires, specifies a fifty percent concentration of carbon dioxide for dry electrical wiring insulation hazards in general.
>
> Contrary to the above, when tested in February, 1979, the Unit 2 4160Vac switchgear room total flooding carbon dioxide fire suppression system did not achieve a fifty per cent concentration. This condition had not been corrected as of the date of the inspection in November 1999.

Pursuant to the provisions of 10 CFR 2.201, PSEG Nuclear LLC is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region I, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Under the authority of Section 182 of the Act, 42 U.S.C. 2232, this response shall be submitted under oath or affirmation.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated at King of Prussia, Pennsylvania
this 14th day of February, 2000

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos:	05000272, 05000311
License Nos:	DPR-70, DPR-75
Report No:	05000272/1999010, 05000311/1999010
Licensee:	PSEG Nuclear LLC
Facility:	Salem Nuclear Generating Station, Units 1 & 2
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Dates:	November 15 - December 9, 1999
Inspectors:	R. L. Fuhrmeister, Sr. Reactor Engineer, Engineering Programs Branch C. G. Cahill, Reactor Engineer, Engineering Support Branch K. A. Young, Reactor Engineer, Engineering Support Branch
Approved By:	William H. Ruland, Chief, Electrical Branch Division of Reactor Safety

SUMMARY OF FINDINGS

Salem Generating Station, Units 1 & 2
NRC Inspection Report 05000272 & 05000311/1999010

An inspection of the fire protection inspectable area was conducted from November 15 - 19, 1999, at the site, and November 22 - 24, 1999, at the Region I office. The inspection consisted of three regional inspectors, with oversight and assistance from a member of the Office of Nuclear Reactor Regulation. The inspection was observed by a member of the New Jersey State Department of Environmental Protection, Bureau of Nuclear Engineering.

Inspection findings were assessed according to potential risk significance and were assigned colors of *green, white, yellow, or red.* The inspection resulted in *green and white* findings. *Green* findings are indicative of issues that, while not necessarily desirable, represent little risk to safety. White findings indicate issues with some increased risk to safety and which may require additional NRC inspections. *Yellow* findings would have indicated more serious issues with higher potential risk to safety and would have required the NRC to take additional actions. *Red* findings would have represented an unacceptable loss of margin to safety and would have resulted in the NRC taking significant actions that could have included ordering the plant to shut down. The findings, considered in total with other inspection findings and performance indicators, will be used to determine overall plant performance.

Cornerstone: Mitigating Systems

- White. The team identified that the carbon dioxide concentration tests for the Units 1 and 2, 4160Vac switchgear rooms did not reach or maintain the required CO_2 concentration of 50%. The CO_2 system also did not meet its design requirements, as stated in the FSAR, which requires the CO_2 tanks to contain a sufficient supply of CO_2 for two full discharges into the largest protected area. This is an apparent violation of the license conditions, which require PSEG to maintain in effect all provisions of the approved fire protection program as described in the Safety Evaluation Reports. Additionally, as identified in Inspection Report No. 50-272; 50-311/97-09, the 4160Vac switchgear rooms contain degraded raceway fire barrier systems. The 4160Vac switchgear rooms were evaluated under the Fire Protection Significance Determination Process and the analysis concluded that the condition was within the increased regulatory response band (White). (Section 1R05.2)

- Green. The team identified that the carbon dioxide concentration tests for the Units 1 and 2, electrical penetration areas (elevation 78) did not reach or maintain the required CO_2 concentration of 50%. This failure is a violation of the license conditions, which require PSEG to maintain in effect all provisions of the approved fire protection program as described in the Safety Evaluation Reports. The rooms are protected by a smoke and thermal detection system and an automatically actuated CO_2 suppression system. The CO_2 storage tank is of sufficient size to allow for a second complete discharge of CO_2 for the room. The electrical penetration areas (elevation 78) were evaluated under the Fire Protection Significance Determination Process and the analysis concluded that the condition was within the licensee's response band. (Section 1R05.2)

- Green. The licensee identified a condition in which they failed to ensure that one train of equipment necessary to achieve hot shutdown from the emergency control station is free of fire damage. The failure is a violation of the requirement of Section III.G.1.a of Appendix R to 10CFR50 and is being treated as a non-cited violation. This issue was evaluated using the significance determination process and was found to be within the licensee response band. (Section 1R05.9)

- Green. The licensee identified a condition in which a fire could damage cables such that the power operated relief valve would open and the associated block valve could not be closed. The inspectors determined that the charging pumps and the safety injection pumps would be available to mitigate the effects of this potential failure. The failure to protect one train of equipment necessary to achieve hot shutdown is a violation of the requirements of Section III.G.1.a of Appendix R to 10 CFR 50. This condition was evaluated using the fire protection significance determination process. Since there are multiple systems with redundant trains available to mitigate this event, the analysis determined that this condition is in the licensee response band. (Section 1R05.10)

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Report Details

1. REACTOR SAFETY

Cornerstones: Initiating Events and Mitigating Systems

1R05 Fire Protection

1 Fire Detection Systems

a. Inspection Scope

The team reviewed the Salem Generating Station "Functional Test of Class 1 Smoke and Thermal Detectors," S1.FP-ST.FD-0029(Q) - Rev. 5, associated system wiring and logic drawings 245056 A 1650-4, 248942-B-9877-1, 602823 B 9573-0, 248941 B 9877-1, 231976 B 9794-7, 231975 B 9794-6, 203761 B 9776-13, 231928-B-9779-12, and 231934-A-1404-12 to evaluate the engineering design and operation of the systems. The team also walked down accessible portions of the fire detection and alarm systems for the 4160Vac, 460Vac, relay rooms and battery rooms to determine if plant equipment or modifications altered the original design bases or effectiveness of the systems.

b. Observations and Findings

There were no findings identified.

2 Fixed Fire Suppression Systems

a. Inspection Scope

The team reviewed the adequacy of the Units 1 and 2 CO_2 fire suppression systems for the electrical penetration areas, the 4160Vac switchgear rooms, and the 460Vac switchgear rooms. Additionally, the team reviewed the adequacy of the Units 1 and 2 Halon systems for the relay rooms.

b. Observations and Findings

The Unit 1 and 2 fixed fire suppression system for the electrical penetration areas, 4160Vac switchgear rooms and 460Vac switchgear rooms are fixed, total flooding CO_2 systems. The CO_2 systems for the electrical penetration areas and 460Vac switchgear rooms are automatically actuated. The licensee received an exemption in the NRC's Safety Evaluation Report (SER) dated June 17, 1983, for the installation of manually actuated CO_2 systems in the 4160Vac switchgear rooms.

The SER dated November 20, 1979, states that the CO_2 systems will be designed in accordance with National Fire Protection Association (NFPA) standard number 12 and requires the total flooding systems to achieve CO_2 concentrations of 50%. National Fire Protection Association (NFPA) standard number 12, required that for a deep-seated fire the design concentration shall be maintained for at least 20 minutes. The team found that the concentration tests for the Unit 1and 2, 4160Vac switchgear rooms and the associated

electrical penetration areas (elevation 78) did not reach or maintain the required CO_2 concentration of 50%.

Additionally, the licensee identified in Notification (formerly Performance Request) Number 00970902190, that the CO_2 system did not meet its design requirements as stated in the FSAR section 9.5.1.7.4 which requires the CO_2 tanks to contain a sufficient supply of CO_2 for two full discharges into the largest protected area. The largest protected areas are the 4160Vac switchgear rooms and require 9820 pounds of CO_2 for a single discharge. The installed tank has a capacity of 10 tons (20000 pounds); however, the weekly surveillance acceptance criterion was only 50% full. The licensee determined that even at 100% CO_2 tank capacity, a full 10 tons of CO_2 could not be delivered to the area in two discharges.

Determination of Risk Significance of 4160 Vac Switchgear Room Deficiencies

The significance of these findings in the 4160Vac Switchgear Rooms was evaluated using the August 2, 1999, draft version of the Fire Protection and Post-Fire Safe Shutdown Inspection Findings Evaluation Guidance. All three divisions of 4160Vac Switchgear are located in the 4160Vac Switchgear Room. The switchgear trains are separated from each other by radiant energy shield walls.

- A fire ignition frequency of $1X10^{-2}$ per year for switchgear rooms was used for the analysis.

- The safe shutdown cables in the room overhead are protected in such a manner that one train is protected by an electrical raceway fire barrier system. The raceway fire barrier system is required to have a 1 hour fire rating. Testing by the licensee demonstrates that the actual rating varies and in some cases is as low as 10 minutes, resulting in a medium to high degradation for the fire barriers. The degraded raceway fire barrier system was identified in Inspection Report No. 50-272; 50-311/97-09.

- The room is protected by a smoke detection system and a manually actuated CO_2 suppression system. Sufficient CO_2 is not available to achieve the design requirement of a second complete discharge of CO_2. The system is manually actuated, rather than automatic, as permitted by the June 17, 1983, exemption for this room, so a medium degradation was assigned for automatic suppression.

- A fire brigade drill was witnessed and the brigade performance was found to be satisfactory corresponding to a low degradation for manual suppression.

- The spacing and placement of the smoke detectors appeared to meet the code.

- Due to the room configuration and the routing of essential cables, credit was given for the recovery of one train within the fire area.

The analysis concluded that this finding was within the increased regulatory response band (White).

Unit 1 license condition C.5 and Unit 2 license condition 2.C.10, require in part, that the licensee shall implement and maintain in effect all provisions of the approved fire protection program. Safety Evaluation Report dated November 20, 1979, is included in the approved fire protection program. The failure of the licensee to ensure that the CO_2 systems, for the Unit 1 and 2, 4160Vac switchgear rooms and relay rooms to reach and maintain the required CO_2 soak concentration of 50% is a violation of the license condition. (**VIO 05000272 & 05000311/1999010-01**)

Determination of Risk Significance of 78 Foot Elevation Electrical Penetration Area Deficiencies

The significance of these findings in the electrical penetration areas (elevation 78), were evaluated using the August 2, 1999, draft version of the Fire Protection and Post-Fire Safe Shutdown Inspection Findings Evaluation Guidance.

- A fire initiation frequency for transient combustibles of $1X10^{-3}$ per year was used.

- The raceway fire barrier system is required to have a 1 hour fire rating. Testing by the licensee demonstrates that the actual rating varies and in some cases is as low as 10 minutes. This resulted in a high degradation for the fire barriers. The degraded raceway fire barrier system was identified in Inspection Report No. 50-272; 50-311/97-09.

- The room is protected by a smoke and thermal detection system and an automatically actuated CO_2 suppression system. The CO_2 storage tank is of sufficient size to allow for a second complete discharge of CO_2 for the room, so the automatic suppression system was assigned a low degradation.

- The spacing and placement of the smoke detectors appeared to meet the code, so no reduction was deemed appropriate.

- A fire brigade drill was witnessed and the brigade performance was found to be satisfactory, corresponding to a low degradation for manual suppression.

- Due to the room configuration and the routing of essential cables, credit was given for the recovery of one train within the fire area.

The analysis concluded that the finding was within the licensee response band (green).

Unit 1 license condition 2.C.5 and Unit 2 license condition 2.C.10, require, in part, that the licensee shall implement and maintain in effect all provisions of the approved fire protection program. Safety Evaluation Report dated November 20, 1979, is included in the approved fire protection. The failure of the licensee to ensure that the CO_2 systems, for the Unit 1 and 2, 4160Vac electrical penetration rooms to reach and maintain the required CO_2 concentration of 50% is a violation of the license condition. This violation is being treated as a non-cited violation, consistent with the Interim Enforcement Policy for Pilot

Plants. PSEG entered this issue into their corrective action program as notifications number 970902190 and 981221206. (**NCV 05000272 & 05000311/1999010-02**)

3 Fire Barriers

a. Inspection Scope

The team, for the plant areas selected, reviewed the adequacy of the design of the fire area boundaries, raceway fire barriers, fire doors and fire barrier penetration seals.

b. Observations and Findings

As previously discussed in section 2, "Fixed Fire Suppression Systems" the degraded raceway fire barrier system was identified in Inspection Report No. 50-272; 50-311/97-09 and violation 50-272&311/EA97257 was issued. The licensee has been evaluating this long standing issue and is developing a corrective action plan. The licensee has met with the Office of Nuclear Reactor Regulation (NRR) to establish a time table for the completion of the corrective actions. As a result of the known degradation of the raceway fire barrier systems and the schedule of completion presented to NRR, no further inspection of these systems were conducted. Violation 50-272&311/EA97257 remains open pending completion of the corrective actions. The raceway fire barrier systems were assumed to be degraded and evaluated under the SDP with other findings in that context.

The team walked down accessible portions of the selected areas to reviewed the adequacy of the design of the fire area boundaries, fire doors and fire barrier penetration seals and found no significant findings.

4 Compensatory Measures

a. Inspection Scope

The team reviewed the "Fire Protection Impairment Tracking Report" dated November 3, 1999, interviewed the Loss Prevention Engineer and accompanied an hourly fire watch on a portion of her tour to verify that adequate compensatory measures were put in place by the licensee for degraded or inoperable fire protection equipment, systems and features.

b. Observations and Findings

There were no findings identified.

5 Post-Fire Safe Shutdown Circuit Analysis

a. Inspection Scope

The team reviewed several drawings, schematics, and wiring diagrams associated with systems and components required for post-fire safe shutdown. The systems and components for these systems included the chemical and volume control system (CVCS), service water system, auxiliary feedwater system, pressurizer instrumentation, and steam generator instrumentation. The team also reviewed safe shutdown analysis DE-PS.ZZ-0001(Q)-A3, "Salem Fire Protection Report - Safe Shutdown Analysis," revision 4, to determine the systems needed for safe shutdown. These reviews were conducted to verify that safety-related and nonsafety-related cables in the selected fire areas had been identified by the licensee and had been analyzed to show that they would not prevent post-fire safe shutdown because of hot shorts, open circuits, or shorts to ground. The team also reviewed isolation capability of equipment needed for post-fire safe shutdown to ensure that this equipment could be operated locally if needed. Additionally, the team reviewed the protection scheme for cable of equipment needed for post-fire safe shutdown.

b. Observations and Findings

The team reviewed several samples of power circuits, control circuits, and instrumentation circuits required post-fire safe shutdown equipment. The team identified no concerns for non-essential circuits routed with required safe shutdown circuits. Additionally, the team did not identify any concerns where fire induced hot shorts, open circuits, or shorts to ground would jeopardize post-fire safe shutdown capability. Additionally, the team found that protection was appropriately provided for post-fire safe shutdown equipment. The team also noted proper isolation capability was in place for control circuits to transfer control of alternate shutdown equipment from the control room to local control for a fire in the control room.

The team found that the licensee had identified conditions of inadequate cable separation during review of their post-fire safe shutdown analysis for the electrical raceway fire barrier system (ERFBS) program. This matter is discussed in further detail in Section 1RO5.9 of this report, LER 50-272/99-11.

6 Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the Salem Generating Station Individual Plant Evaluation for External Events (IPEEE), Section 4, "Internal Fires Analysis," DE-PS.ZZ-0001(Q)-A3-SSA, "Salem Fire Protection Report - Safe Shutdown Analysis," Rev. 4, DE-PS.ZZ-0001(Q)-A2-FHA, "Salem Fire Protection Report-Fire Hazards Analysis," Rev. 5, and S2.OP-AB.CR-002(Q), Rev. 9, "Control Room Evacuation Due To Fire in Control Room, Relay Room, or Ceiling of the 460/230Vac Switchgear Room," to evaluate the methods and equipment used to

achieve alternative shutdown for the Salem Generating Station. The team also performed field walkdowns to evaluate the protection of the equipment from the effects of fires.

b. Observations and Findings

The team determined that the control circuit cables for the alternative shutdown equipment had not been separated from redundant or associated circuit cables, nor protected from the effects of a fire. This matter is discussed in further detail in Section 1RO5.9 of this report, LER 50-272/99-11.

7 Operational Implementation of Alternative Shutdown Capability

a. Inspection Scope

The team reviewed the training lesson plan for the alternative shutdown procedure, discussed training with several senior reactor operators, inventoried the Unit 1 Appendix R locker in the Unit 2 Turbine Building, reviewed minimum shift manning required by technical specifications, and evaluated the accessibility of the alternative shutdown operating stations.

b. Observations and Findings

Technical Specification (T.S.) Table 6.2-1, for both units, provides the minimum shift crew composition. The required personnel varies with the operating mode of both units. With both units in Mode 1 through 4, the technical specifications allow sharing several positions between the units, including Operations Supervisor, Shift Technical Advisor (STA), Maintenance Electrician, and one Equipment Operator. The T.S. also allows combining the STA and Control Room Supervisor (CRS) positions if the STA is a licensed senior reactor operator. The alternate shutdown procedure (S2.OP-AB.CR-002(Q)) sends the STA and the CRS to different emergency control stations. Thus, if the STA and CRS positions are combined, there may not be sufficient personnel to man the emergency operating stations for a single unit. In the event that positions are shared between units, there may be insufficient personnel to man the emergency control stations in the event that the control room complex needs to be abandoned due to a fire and both units require alternative shutdown to be carried out. PSEG identified this issue, and documented it in Notification 00970509099 (formerly performance improvement request), dated May 12, 1997. By letter LR-N970817, dated January 22, 1998, PSEG committed to maintain the minimum staffing levels necessary to perform simultaneous alternate shutdown of both units, and control minimum staffing in accordance with administrative procedures. Order 00980526170 (formerly business unit performance improvement request) was generated May 26, 1998, to revise NC.NA-AP.ZZ-0005(Q), “Station Operating Practices,” to reflect the additional staffing requirement. This order was closed March 11, 1999, on the basis of generating a revision request to add a note concerning the Salem minimum shift complement necessary to perform a dual unit Appendix R shutdown at the next regular revision of the procedure.

During the inventory of the Unit 1 Appendix R Locker on the 122' elevation of the Unit 2 turbine building, the team identified that the tool kit for the No. 3 Nuclear Equipment Operator (NEO) was missing a key. The key is necessary for performing motor operated valve (MOV) manipulations at the 230Vac motor control center (MCC) cubicles. Keys are necessary to override the breaker-door interlock on the MCC cubicle, and to operate the control transfer and emergency operation switches within the cubicles. PSEG subsequently identified that the same key was missing from the same toolkit in the Unit 2 Appendix R Locker. Replacement keys were obtained by Work Control Center personnel and placed in the toolkits. The team determined that this missing key would not have resulted in a delay in carrying out MOV manipulations, since the missing key was available in both the No. 2NEO and shift technician toolkits, as well as being on the duty NEO keyring, normally carried by the watchstander.

8 Emergency Lighting

a. Scope of Inspection

The team reviewed the adequacy of emergency lighting provided for alternative safe shutdown along access and egress routes, at control stations, at plant parameters monitoring locations, and at manual operating stations.

b. Observations and Findings

There were no findings identified.

9 Licensee Event Report 50-272/99-11

a. Scope of Inspection

The team reviewed the contents of LER 50-272/99-11, observed the layout of the cable trays in the ceiling area of the 460Vac Switchgear Room, observed the cable shield grounding of cable shields in the relay room cabinets, and inspected the routing of individual cables associated with the charging pump control circuits.

b. Observations and Findings

The LER described a condition which was identified by PSEG during its review and update of the Salem Post Fire Safe Shutdown Analysis. Specifically, the control circuit wiring carrying the 125VDC control power for the 4160Vac circuit breakers in the ceiling area of the 460Vac switchgear rooms and in the relay rooms was neither separated from redundant train wiring, nor protected from the effects of a fire. In addition, the control circuit wiring routed in the cable trays is not isolable from the control circuitry in the switchgear cubicles. This condition could result in hot shorts from associated circuit 125VDC cables energizing the trip coils of the 4160Vac circuit breakers, preventing their closing. The inability to close these breakers could result in the inability to achieve safe, stable shutdown conditions for this alternate shutdown area.

The failure to protect alternate shutdown equipment in an alternate shutdown area is a violation of the requirement of Section III.G.1.a of Appendix R to 10CFR50 to ensure that one train of equipment necessary to achieve hot shutdown from the emergency control station is free of fire damage. This issue was evaluated using the August 2, 1999, draft version of the Fire Protection and Post-Fire Safe Shutdown Inspection Findings Evaluation Guidance, the fire ignition frequency for the switchgear room of $1X10^{-2}$ per year, and a .1 factor multiplied twice to account for the necessity of having multiple shorts of proper polarity. This analysis concluded that the finding was within the licensee response band (Green), based on the low potential for cable faults to provide the required hot shorts, the full capability of the installed automatic gaseous (CO_2) fire suppression system, and the observed good performance of the on-site fire company. This issue is in PSEG's corrective action program under notification number 20010915. LER 50-272/99-11 is closed. (**NCV 05000272 & 05000311/1999010-03**)

10 Licensee Event Report 50-272/99-09

a. Scope of inspection

The team reviewed the contents of LER 50-272/99-09, and reviewed the plant design to determine what high pressure makeup sources were available.

b. Observations and Findings

The LER describes a condition which was identified by PSEG during its review and update of the Salem Post-Fire Safe Shutdown Analysis. Specifically, the cables for the power operated relief valves and the associated block valves are run in the same cable tray inside the containment. As a result, a fire could damage the cables such that the power-operated relief valve would open, and the associated block valve could not be closed. The failure to protect one train of equipment necessary to achieve hot shutdown is a violation of the requirements of Section III.G.1.a of Appendix R to 10 CFR 50. The team determined that the charging pumps and the safety injection pumps would be available to mitigate the effects of this potential failure. This condition was evaluated using the draft fire protection significance determination process. Since there are multiple systems with redundant trains available to mitigate this event, the analysis determined that this condition is in the licensee response band (Green). This issue is in PSEG's corrective action program under notification number 2008491. LER 50-272/99-09 is closed. (**NCV 05000272 & 05000311/1999010-03**)

4. OTHER ACTIVITIES [OA]

4OA5 Management Meetings

1 Exit Meeting Summary

The results of this inspection were discussed with plant personnel at an informal debriefing on November 19, 1999, and at a formal inspection exit on December 9, 1999. Following review of the preliminary inspection findings by the SDP panel, a re-exit was held February 7, 2000, to update the licensee on changes to the preliminary inspection findings.

ITEMS OPENED AND CLOSED

Opened/Closed

05000272 & 05000311/1999010-01	VIO	Failure to ensure that the CO_2 fire suppression systems for the Unit 1 and 2 4160Vac switchgear rooms achieved and maintained the required 50% CO_2 concentration (Section 1RO5.2)
50-272 & 50-311/99-07-02	NCV	Failure of the licensee to ensure that the CO_2 systems, for the Unit 1and 2, electrical penetration rooms to reach and maintain the required CO_2 soak concentration of 50%. (Section 1R05.2)
50-272 & 311/99-07-03	NCV	Failure to ensure that one train of equipment necessary to achieve hot shutdown from the emergency control station is free of fire damage in accordance with the requirement of Section III.G.1.a of Appendix R to 10CFR50. (Section 1R05.9 and 1RO5.10)

Closed

50-272/99-11	LER	Failure to ensure that one train of equipment necessary to achieve hot shutdown from the emergency control station is free of fire damage in accordance with the requirement of Section III.G.1.a of Appendix R to 10CFR50. (Section 1R05.9)
50-272/99-09	LER	Cables for the power operated relief valves and the associated block valves run in the same cable tray inside the containment. (Section 1R05.10)

LIST OF ACRONYMS USED

CCW	Component Cooling Water
CFCU	Containment Fan Cooler Unit
CFR	Code of Federal Regulations
CRS	Control Room Supervisor
CVCS	Chemical & Volume Control System
CO_2	Carbon dioxide
ERFBS	Electrical Raceway Fire Barrier System
ECAC	Emergency Control Air Compressor
GL	Generic Letter
GTG	Gas Turbine Generator
LCO	Limiting Condition for Operation
LER	Licensee Event Report
MCC	Motor Control Center
MHIF	Multiple High Impedance Fault
MOV	Motor Operated Valve
NCV	Non-Cited Violation
NEO	Nuclear Equipment Operator
NOED	Notice of Enforcement Discretion
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSR	Non-Safety Related
PORV	Power Operated Relief Valve
PRT	Pressurizer Relief Tank
PSEG	Public Service Enterprise Group - Nuclear LLC
psig	pounds per square inch gauge
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RHX	Regenerative Heat Exchanger
RO	Reactor Operator
RWST	Reactor Water Storage Tank
SR	Safety Related
SRO	Senior Reactor Operator
STA	Shift Technical Advisor
SWHX	Seal Water Heat Exchanger
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
Vac	Volts, Alternating Current
VCT	Volume Control Tank
VDC	Volts, Direct Current

List of Documents Reviewed

Station Procedures

NC.NA-AP.ZZ-0005(Q), Rev. 9, “Station Operating Practices”
S2.OP-AB.CR-0002(Q), Rev. 9, “Control Room Evacuation due to Fire in Control Room, Relay Room, or Ceiling of the 460/230V Switchgear Room”
SC.OP-AP.ZZ-0108(Q), Rev. 9, “Removal/Return of Nuclear Safety Equipment”
S1.FP-ST.FD-0029(Q) - Rev. 5, “Functional Test of Class 1 Smoke and Thermal Detectors”
FRS-II-441, “Pre-Fire Plan Relay and Battery Rooms, and Corridor Elevation 100'-0"”
FRS-II-421, “Pre-Fire Plan 4160V Switchgear rooms and Battery Rooms, Elevation 64'”
S1.OP-AB.460-0001(Q), Loss of 1A 460/230V Vital Bus, Rev. 5
S1.OP-AB.4KV-0002(Q), Loss of 1B 4KV Vital Bus, Rev. 3
S1.OP-AB.115-0003(Q), Loss of 1C 115V Vital Instrument Bus, Rev. 7
S2.FP-PM.LTS-0039 (Q) Rev. 6, “Appendix R Self-Contained, Battery Powered Emergency Light Unit Inspection and Preventive Maintenance”
S2.FP-ST.LTS-0039 (Q) Rev.76, “Appendix R Self-Contained, Battery Powered Emergency Light Unit Test”
S2.FP-ST.LST-0070(Q) Rev. 2, “Battery Powered Emergency Light 8 Hour Functional Test”
NC.NA-AP.ZZ-0025(Q), Rev. 4, “Operational Fire Protection Program”
S1.FP-ST.FS-0048(Q), Rev. 1, “Halon 1301 System Functional Test and Inspection”
S1.FP-SV.FS-0066(Q), Rev. 4, “Relay Room Halon Cylinders Volume and Pressure Check”
SC.FP-ST.FS-0008(Q) - Rev.1, “ Fire Main Flow Test”

Notifications

00970509099, “Shift Manning Level fore Dual Unit S/D Outside CR”
00970902190, “USFAR Section 9.5 Updates (Fire Protection)”
00981221206, “Carbon Dioxide Design Calculation Error”
20013042, “Halon System Discharge Hoses Need Hydro”
20013043, “Halon System Discharge Hoses Need Hydro”
20013030, “Fire Door 126-1 Needs Repair”
20007419, “Procedural Non-Compliance with DEAP-6 and NAP-43"

Orders

00980526170, “Revise NAP-5 for Salem Shift Crew Complement”

Safety Evaluations

S 97-325, Rev. 0, “Control Room Minimum Staffing To Satisfy Appendix R Requirement”
S-0-FP-MEE-0756,Rev 3, “Salem Generating Station, Units 1 and 2 Fire Pump Piping (As Built) Configuration Justification”

Drawings

217653 A 8891-4, “No. 1 & 2 Units-Aux Building Control Area FL Frames & Trenches-EL.100'0"
245056 A 1650-4, “Unit 2Fire Protection Smoke & Fire Detection”
248942-B-9877-1, “Units 1& 2 Control Area Fire Protection Halon System Wiring Diagram”
248941 B 9877-1, “Units 1& 2 Control Area Fire Protection Halon System Wiring Diagram”
231976 B 9794-7, “Units 1& 2 Fire Protection Fire Alarm System Smoke and Fire Detection”
231975 B 9794-6, “Units 1& 2 Fire Protection Fire Alarm System Smoke and Fire Detection”
203761 B 9776-13, “Units 1& 2 Fire Protection Fire Alarm System Smoke and Fire Detection”
231928-B-9779-12, “Units 1& 2 CO_2 Fire Protection System”
231934-A-1404-12, “Units 1& 2 CO_2 Fire Protection System”
M-04, “ PSE&G Halon 1301 - Piping Unit 1"
602144 B 9803-1, “Unit 1 Penetration Seal Locations Room 15557 EL 100' Upper Electrical Penetration Ares - Floor, Sheet 1"
604712 B 9569 - 0, “ Unit 1 Penetration Seal Locations Room 15557 EL 100' Upper Electrical Penetration Ares - South Wall"
602160 B 9803 -1, “Unit 1 Penetration Seal Locations Room 15301 EL 64' Control Area #1 4160V Vital Bus -South Wall”
602160 B 9803 -0, “Unit 1 Penetration Seal Locations Room 15301 EL 64' Control Area #1 4160V Vital Bus -South Wall”
600171-A-8764-1, “Carbon Dioxide System 84' Switchgear Rooms”
600170-A-8764-4, “Carbon Dioxide System 78' & 64' Switchgear Rooms”
205328 SIMP-01, “Chemical & Volume Control - Simplified P&ID, Rev. 1"
205336 SIMP-0, “Auxiliary Feedwater System Simplified P&ID, Rev. 0"
205342 SIMP-0, “Service Water Simplified P&ID, Rev. 1"
205342 SIMP-01,” Sh. 2, Service Water Simplified P&ID, Rev. 1"

Schematics

218863 B 9781-11,	No. 2 Unit - CVCS No. 22 Charging Pump, Rev. 11
218862 B 9781-07,	No. 2 Unit - CVCS No. 22 Charging Pump & No. 22 Charging Pump Aux. Lube oil Pump, Rev. 7
203828 B 9773-21,	No. 1 & 2 Units - 1A & 2A - 4160V. Vital Buses No. 15 & 21 Service Water Pumps, Rev. 21
203829 B 9773-12,	No. 1 & 2 Units - No. 15 & 21 Service Water Pumps, Rev. 12
211578 A 583-16,	No. 2SJ1 Charging Pump Suction From RWST & No. 2CV116 Seal Water to VCT Isolation Valve, Rev. 16
211580 A 583-17,	No. 2SJ2 Charging Pump Suction from RWST & No. 2CV284 Seal Water to VCT Isolation Valve, Rev. 17
203319 B 9781-22,	No.1 & 2 Units- Aux. Feedwater System No. 13 & 23 Aux. Feed pumps & Turbines, Rev. 22
203315 B 9769-34,	No. 1 and 2 Units - Aux. Feedwater System No. 12 & 22 Aux. Feed Pumps, Rev. 34
211564 A 9772-19,	No. Unit - CVCS No. 2CV140 & 2CV69 Charging Discharge and No. 2CV79 RCS Charging Isolation Valve, Rev. 19
211566 B 583-16,	No. 2 Unit - CVCS No. 2CV139 Discharge to SWHX No. 2CV68 Discharge to RHX Isolation Valves, Rev. 16
203830 B 9774-19,	No. 1 & 2 Units-1B & 2B-4160V. Vital Buses No. 13 & 23 Service Water Pumps

220904 B 9786-10,	No. 2 Unit - Service Water Intake 2A 230V. Vital Bus Isolation Valve No. 22 SW20, Rev. 10
220901 B 7786-10,	No. 2 Unit - Service Water Intake 2C 230V. Vital Bus Isolation Valve No. 24 SW20, Rev. 10
220903 B 9786-15,	No.2 Unit Service Water Intake 2B 230V. Vital Bus Isolation Valve No. 2 SW26, Rev 15
220902 B 9786-14,	No. 2 Unit Service Water Intake 2C 230V. Vital Bus Isolation Valve No. 23 SW20, Rev. 14
220906 B 9787-17,	No. 2 Unit Service Water Intake 2A 230V. Vital Bus Isolation Valve No. 21 SW20, Rev. 17
220984 B 9793-9,	No.2 Unit- Penetration Area Service Water System Stop Valve No. 21 SW22, Rev. 9
220988 B 9793-10,	No. 2 Unit - Penetration Area Service Water System Stop Valve No. 22 SW22, Rev. 10
220986 B 9793-10,	No.2 Unit - Penetration Area Service Water System Tie Valve No. 21 SW23, Rev. 10
220985 B 9793-9,	No. 2 Unit - Aux. Bldg. Service Water System Stop Valve No. 21 SW21, Rev. 9
220989 B 9793-9,	No. 2 Unit - Aux. Bldg. Service Water System Stop Valve No. 22 SW21, Rev. 9
218894 B 9781-11,	No. 1 & 2 Units - CVCS No. 1CV71, 2CV71, 1CV55 & 2CV55 Charging Flow and Pressure Control Valves, Rev. 11
211566 B 583-16, Sh. 2,	No. 2 Unit CVCS No. 2CV139 Discharge to RHX Isolation Valves, Rev. 16
211564 A 9772-19, Sh. 2,	No. 2 Unit - CVCS No. 2CV140 & 2CV69 Charge Discharge & No. 2CV79 RCS Charging Isolation Valve, Rev. 19
211563 ABL 583-3,	No. 1 & 2 Units - CVCS No. 1CV140, 2CV140, 2CV140, 1CV69 & 2CV69 Charging Discharge and No. 1CV79 & 2CV79 RCS Charging Isolation Valves, Rev. 3
211582 B 4025-14, Sh. 2,	No. 2 Unit - CVCS No. 2CV40 Volume Control Tank First Discharge Stop Valve, Rev. 14
211581 ABL 586-2,	No. 1 & 2 Units - CVCS No. 1CV40 & 2CV40 Volume Control Tank First Stop Valves, Rev. 2
211585 ABL 586-5,	No. 1 & 2 Units -CVCS No. 1CV35 & 2CV35 Volume Control Tank Level Control Valves, Rev. 5
211580 A 583-17,	No. 1 Unit - CVCS No. 1SJ2 Charge Pump Suction from RWST & No. 1CV284 Seal Water to VCT Isolation Valves, Rev. 17
202414 ABL 596-2,	No. 1 & 2 Units - Aux. Feedwater System No. 11, 12, 13, 14, 21, 22, 23, & 24 AF11 S.G. Inlet Valves, Rev. 2
203411 B 9782-13	No. 1 & 2 Units - Aux. Feedwater System No. 11, 12, 21, & 22 AF21 S.G. Inlet Valves, Rev. 13
208550 A 8818-45, Sh. 2,	No. 2 Unit - Aux. Bldg. Control Area - Conduits & cable Bel. El. 84'-0", Rev. 45
208551 A 8818-6, Sh. 2,	No. 2 Unit - Aux. Bldg. Control Area - Conduits & Cable Bel. El. 100'-0", Rev. 6
208575 A 8819-25, Sh. 2,	No. 2 Unit Aux. Bldg. Cols. FF-MM, 14-17.6 Conduits and Cable Bel. El. 100'-0", Rev. 25
208851 A 8818-0, Sh. 3,	No.2 Unit - Aux. Bldg. Control Area - Details & Sections Bel. El. 100'-0", Rev. 0

208576 A 8819-26,	No. 2 Unit - Aux. Bldg. Cols. MM-TT, 14-17.6 Conduits & Trays Bel. El. 84'-0", Rev 26
208575 A 8819-23, Sh. 3,	No. 2 Unit Aux. Bldg. Cols. FF-MM, 14-17.6 Details & Sections Bel. El. 84'-0", Rev. 23
208550 A 8818-38,	No. 2 Unit Aux. Bldg. Control Area - Trays & Inserts Bel. El. 84'-0", Rev. 38
208577 A 8819-46,	No.2 Unit Aux. Bldg. Cols. FF-MM 14-17.6 Conduits & Trays Bel. El. 100'-0", Rev. 46
208578 A 8819-41,	No. 2 Unit Aux Bldg. Cols. MM-TT, 14-17.6 Conduits & Trays Bel. El. 100'-0", Rev. 41
203061 A 8789-32,	No. 2 Unit 4160V. Unit 4160V. Vital Buses One Line, Rev. 32
203063 A 8789-31,	No. 2 Unit 460V. & 230V. Vital & Non Vital Bus One Line Control, Rev. 31
601392 B 9535-19,	No. 2 Unit-Aux. Bldg. Control Area 2C-460V. Vital Bus One-Line, Rev. 19
222482 A 1779-22,	No. 2 Unit-Aux. Bldg. 2C Diesel 230V. Vital Control Ctr. One-Line, Rev. 22
222485 A 1779-43,	No. 2 Unit-Aux. Bldg. 2C West Valves & Misc. 230V. Vital Contr. Ctr. One-Line, Rev. 43
222507 A 1779-27,	No. 2 Unit-Penetration Area 2C East Valves & Misc. 230V. Vital Contr. Ctr. One-Line, Rev. 27
222510 A 1779-24,	No. 2 Unit-Penetration Area 2C Vet. 230V. Vital Control Center One-Line, Rev. 24
222478 A 1779-25,	No. 2 Unit-2C Service Water Intake 230V. Vital Control Center One-Line, Rev. 25
211640 B 9770-17,	No. 1 & 2 Units -1C & 2C 4160V, Vital Buses No. 12 & 22 Containment Spray Pumps, Rev. 17
211637 B 9770-11,	No. 1 & 2 Units - 1A & 2A 4160 Vital Buses No. 11 & 21 Safety Injection Pumps, Rev. 11
211503 B 583-14, Sh. 2,	No. 2 Unit -Residual Heat Removal System No. 22 Residual Heat Removal Pump, Rev. 14
211517 ABL 583-10,	No. 1 & 2 Units - Component Cooling System No. 11 and 21 Component Cooling Pumps, Rev. 10

Calculations

ES-13.006(Q),	Breaker & Relay Coordination Calculation Safety Related AC System, Rev. 2
ES-44.018,	Salem Units 1 & 2 Electrical Coordination for Appendix R Applications, Rev. 0

Correspondence

Letter LR-N970817, dated January 22, 1998, “Control of Minimum Staffing Requirements for Dual Unit Shutdown Outside of the Control Room Commitment Change, Salem Generating Station Unit Nos. 1 and 2, Docket Nos. 50-272 and 50-311"

Codes and Standards

NFPA 12 Standard on Carbon Dioxide Extinguishing Systems, 1998 Edition
NFPA 12A Standard on Halon 1301 Extinguishing Systems, 1997 Edition

Other Documents

SH.DE-TS.ZZ-2037(Q), Rev. 1, “Fuse Selection Design Standard for Salem & Hope Creek Generating Stations”
Distribution of Vendor Calculation (CO_2 Fire Suppression System) S-C-M200MDC-0148-0
“No. 1 Unit Fire Protection System CO_2 System concentration Test Switchgear Rooms,” dated February 25, 1975
“Test Engineer Field Pre-Operational Check List No. 1 Unit Fire Protection System CO_2 System Concentration Test for Switchgear Rooms Elevation 64' and 84' and Electrical Penetration Area Elevation 78',” dated November 30, 1973
DTP-43H3, “Test Engineer Field Pre-Operational Check List No. 2 Unit Fire Protection System CO_2 System Concentration Test for Switchgear Rooms Elevation 64' and 84',” dated February 1, 1979
DTP-43H4, “Test Engineer Field Pre-Operational Check List No. 2 Unit Fire Protection System CO_2 System Concentration Test for Lower Electrical Penetration Area Elevation 78',” dated March 12,1979
File No. 761205. “ System Discharge Performance Test for Salem Generating Station Halon 1301 Fire Extinguishing System Unit 1 Relay Room, December 5, 1980"
File No. 761205. “ System Discharge Performance Test for Salem Generating Station Halon 1301 Fire Extinguishing System Unit 2 Relay Room, October 31, 1980"
SC.DE-TS.ZZ-2032(Q), “Physical Separation Requirements (Electrical)”
NTLP-FW-CBTC, “Fire Protection Training, Fire Watch Training”
DE-PS.ZZ-0001(Q)-A3, Salem Fire Protection Report - Safe Shutdown Analysis, Rev. 4