

March 27, 2003

Mr. Harold W. Keiser  
Chief Nuclear Officer and President  
PSEG Nuclear LCC - N09  
P.O. Box 236  
Hancocks Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION - TRIENNIAL FIRE PROTECTION  
INSPECTION REPORT 50-272/03-002, 50-311/03-002

Dear Mr. Keiser:

On February 28, 2003, the NRC completed a triennial fire protection inspection at your Salem Generating Station facility. The enclosed report documents the inspection findings that were discussed on February 28, 2003, with Mr. J. Carlin, Mr. D. Garchow and other members 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. This inspection was a reduced scope inspection in accordance with the March 23, 2001, revision to IP 71111.05, "Fire Protection." Issues regarding equipment malfunction due to fire-induced failures of associated circuits were not inspected. Criteria for review of fire-induced circuit failures are currently the subject of a voluntary industry initiative.

No findings of significance were identified.

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We appreciate your cooperation. Please contact me at (610) 337-5129, if you have any questions regarding this letter.

Sincerely,

**/RA/**

James C. Linville, Chief  
Electrical Branch  
Division of Reactor Safety

Docket No: 50-272; 50-311  
License No: DPR-70; DPR-75  
Enclosure: NRC Inspection Report 50-272/03-002, 50-311/03-002

cc w/encl:

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Mr. Harold W. Keiser

3

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No: 50-272, 50-311

License No: DPR-70, DPR-75

Report No: 50-272/03-002, 50-311/03-002

Licensee: PSEG Nuclear, LCC

Facility: Salem Nuclear Generating Station, Unit 1 and 2

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

Dates: February 10-14 and 24- 28, 2003

Inspectors: Roy Fuhrmeister, Senior Reactor Inspector, DRS  
Leonard Cheung, Senior Reactor Inspector, DRS  
Keith Young, Reactor Inspector, DRS

Approved by: James C. Linville, Chief  
Electrical Branch  
Division of Reactor Safety

## SUMMARY OF FINDINGS

IR 05000272/03-002, IR 05000311/03-002, Salem Unit 1 and Unit 2 on 2/10-14 and 2/24-28/2003, Fire Protection.

The report covered a two week team inspection by regional specialist inspectors. One unresolved item with potential safety significance was identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

This inspection was a reduced scope inspection in accordance with the March 23, 2001, revision to IP 71111.05, "Fire Protection." Issues regarding equipment malfunction due to fire-induced failures of associated circuits were not inspected. Criteria for review of fire-induced circuit failures are currently the subject of a voluntary industry initiative.

A. Inspector Identified Findings

No findings of significance were identified

B. Licensee Identified Violations

None

## Report Details

### Background

This report presents the results of a triennial fire protection inspection conducted in accordance with NRC Inspection Procedure (IP) 71111.05, "Fire Protection." The objective of the inspection was to assess whether PSEG Nuclear, LLC (PSEG), has implemented an adequate fire protection program and that post-fire safe shutdown capabilities have been established and are being properly maintained at the Salem Generating Station (SGS). The following fire areas were selected for detailed review based on risk insights from the Salem Generating Station Individual Plant Examination of External Events (IPEEE):

- Component Cooling Pump Room, 1(2)-FA-AB-84C
- Reactor Plant Auxiliary Equipment Area, Auxiliary Building 45', 1(2)-FA-AB-84C
- Reactor Plant Auxiliary Equipment Area, Auxiliary Building 100', 1(2)-FA-AB-100C
- Turbine Building, 1(2)-FA-TGA-88

This inspection was a reduced scope inspection in accordance with the March 23, 2001, revision to IP 71111.05, "Fire Protection." Issues regarding equipment malfunction due to fire-induced failures of associated circuits were not inspected. Criteria for review of fire-induced circuit failures are currently the subject of a voluntary industry initiative. The definition of associated circuits of concern used was that contained in the March 22, 1982, memorandum from Mattson to Eisenhut, which clarified the requests for information made in NRC Generic Letter 81-12.

## **1. REACTOR SAFETY**

Cornerstones: Initiating Events, Mitigating Systems

### 1R05 Fire Protection (71111.05)

#### .1 Programmatic Controls

##### a. Inspection Scope

During tours of the SGS, the team observed the material condition of fire protection systems and equipment, the storage of permanent and transient combustible materials, and control of ignition sources. The team also reviewed the procedures that controlled hot-work activities and combustibles at the site. This was accomplished to verify that PSEG was maintaining the fire protection systems, controlling hot-work activities, and controlling combustible materials in accordance with their fire protection program.

##### b. Findings

No findings of significance were identified.

Enclosure

## .2 Passive Fire Barriers

### a. Inspection Scope

During tours of the SGS, the team evaluated the material condition of fire walls, fire doors, fire dampers and fire barrier penetration seals to ensure that PSEG was maintaining the passive features in a state of readiness.

The team randomly selected six fire barrier penetration seals and two fire dampers for detailed inspection to verify proper installation and qualification. The team reviewed associated design drawings, test reports, and engineering analyses. The team compared the observed in-situ seal configurations to the design drawings and tested configurations. Additionally, the team compared the penetration seal and fire damper ratings with the ratings of the barriers in which they were installed. This was accomplished to verify that PSEG had installed the selected penetration seals and fire dampers in accordance with their design and licensing bases.

### b. Findings

No findings of significance were identified.

## .3 Fire Detection Systems

### a. Inspection Scope

The team performed a walkdown of the selected fire areas to verify the existence and adequacy of fire detection systems in the selected fire areas. In addition, the team reviewed completed surveillance procedures to verify the adequacy and frequency of fire detection component testing. This review was performed to ensure that the fire detection systems for the selected fire areas met their design and licensing bases.

### b. Findings

No findings of significance were identified.

## .4 Fixed Fire Suppression Systems and Equipment

### a. Inspection Scope

The team evaluated the adequacy of the wet pipe sprinkler systems and deluge systems in the turbine building by performing a walkdown of the systems, review of installation drawings and reviews of functional testing. This review was performed to verify that the selected fixed suppression systems met their design and licensing bases.

b. Findings

No findings of significance were identified.

.5 Manual Fire Suppression Capability

a. Inspection Scope

The team walked down selected standpipe systems, hose reels and portable fire extinguishers to determine the material condition of manual fire fighting systems. Diesel fire pump flow and pressure tests were reviewed by the team to ensure the pumps were meeting design requirements. Fire main loop flow testing was reviewed to ensure no degradation of the piping had occurred. The team reviewed the pre-fire plans for the target fire areas to verify accuracy of the plans versus the installed fire protection features in the selected fire areas.

The team inspected the fire department's protective ensembles, self-contained breathing apparatus (SCBA), portable communications equipment and various other fire department equipment to determine material condition and operational readiness of equipment for fire fighting.

The team reviewed Fire Department Initial Training and Fire Department Continuing Training course materials to verify appropriate training was being conducted for the station firefighting personnel. Additionally, the team reviewed selected fire drills and critiques to ensure that drills were being conducted in risk significant areas.

The team reviewed the qualifications of several fire department members to ensure that they had met and maintained the requirements to be fire department members.

b. Findings

No findings of significance were identified.

.6 Post-Fire Safe Shutdown Emergency Lighting and Communications

a. Inspection Scope

The team observed the placement and aiming of eight-hour emergency lighting units (ELUs) throughout the selected fire zones to evaluate their adequacy for illuminating access and egress pathways and equipment requiring local operation for post-fire safe shutdown. In addition, during the alternate shutdown procedure walk through documented in Section 1RO5.8, "Alternative Shutdown Capability," the team verified that emergency lights were provided where needed.

The team reviewed surveillance and preventive maintenance procedures to ensure operational readiness of the ELUs.



The team reviewed radio repeater location and power sources to ensure fire department and operator communications could be maintained for fire fighting and post-fire safe shutdown conditions.

b. Findings

No findings of significance were identified.

.7 Electrical Raceway Fire Barrier Systems

a. Inspection Scope

PSEG completed installation of a replacement electrical raceway fire barrier system (ERFBS) in December 2002. This represented the culmination of a major project which started in 1997. The project included reanalysis of the SGS post-fire shutdown capability, evaluation of the effects of fires on off-site power availability, design and installation of a charging and boric acid transfer system cross-tie, and design and testing of the replacement ERFBS.

The team walked down accessible portions of the lower electrical penetration fire area to observe material condition of the ERFBS. Additionally, the team reviewed design and installation drawings, installation procedures, qualifications testing documents and engineering analyses for selected configurations. The NRC safety evaluations of fire protection features for SGS were also reviewed by the team. This review was performed to verify that the selected portions of the fire barrier system met their design and licensing bases and the tested configuration.

b. Findings

No findings of significance were identified.

.8 Implementation of Alternative Shutdown Capability

a. Inspection Scope

The team reviewed control circuits for selected alternate shutdown components (motor - operated and solenoid valves, pumps, fans and chillers) to ensure that proper isolation was provided for alternate shutdown capability and performed field walkdowns to evaluate the protection of the equipment from the effects of fires.

The inspectors reviewed operating procedures, calculations, and modifications to equipment and piping systems related to the implementation of the charging and boric acid cross-tie for post fire shutdown use. The inspectors performed a walkdown of selected procedures for lining up the cross-tie. During the walkdown, the inspectors evaluated equipment access in a post-fire operating environment, lighting, and adequacy of procedural guidance.

b. Findings

No findings of significance were identified.

.9 Safe Shutdown Capability

a. Inspection Scope

The team reviewed the Salem Fire Hazards Analysis (FHA), Document No. NC.DE-PS.ZZ-0001(Q)-A2-FHA, Revision 6, and associated Safe Shutdown Analysis Reports to confirm that PSEG had identified the methods and the structures, systems, and components (SSCs) necessary to achieve hot shutdown and cold shutdown following postulated fires in the selected risk significant fire areas. The team further reviewed the applicable flow diagrams, instrument drawings and the safe shutdown components list to identify the components required for establishing the specified flow paths and for isolating the flow diversion paths. The team sampled sections of operating procedures associated with shutdown following a fire, to confirm the availability of selected components required for different fire scenarios.

The team verified that the applicable requirements of 10 CFR 50, Appendix R, Sections III.G and III.L for achieving and maintaining safe shutdown were properly addressed. The team verified that systems necessary to assure the safe shutdown functions of reactivity control, reactor coolant makeup, reactor heat removal, and process monitoring were protected within, or independent of, the selected fire zones. Where deviations from Appendix R requirements were identified, the team verified that the deviations either had been approved or were being reviewed by the NRC (e.g. the extensive use of cross-connections between Units 1 & 2 to achieve safe shutdown) and that conditions required by the deviations were implemented and being maintained.

The team reviewed the Appendix R circuit breaker coordination study, Calculation ES-44.018, Salem Units 1 and 2 Electrical Coordination for Appendix R Applications, to determine whether breaker coordination problems were identified and resolved. Further, the team interviewed circuit breaker maintenance personnel and reviewed Appendix R breaker maintenance activities to verify that circuit breakers required for post-fire safe shutdown were properly maintained, and were ready to energize the post-fire shutdown equipment upon demand.

b. Findings

No findings of significance were identified.

.10 Safe Shutdown Circuit Analyses

a. Inspection Scope

For the selected fire areas, the inspectors reviewed the PSEG Safe Shutdown Analysis Report (SSAR) to ensure at least one post-fire safe shutdown success path is

Enclosure

maintained free of fire damage. This included a review of manual actions and the necessary repairs to reach cold shut down within 72 hours. The inspectors also reviewed selected procedures and calculations to ensure that adequate direction was provided to the operators to perform the necessary manual actions. Factors, such as timing, access to the equipment, and the availability of procedures, were considered in the inspectors' review.

b. Findings

Introduction. A finding was identified in that, for three fire areas, PSEG has not protected a full train of equipment necessary to achieve and maintain hot shutdown. For three fire areas, postulated fires could result in the spurious opening of up to two steam generator power operated relief valves (SGPORV). This could prevent achieving and maintaining hot shutdown, as PSEG calculations indicated that opening one SGPORV could result in a cooldown transient of approximately 300 degrees per hour. This is an unresolved item pending generic resolution of circuit analysis issues by NRR and NEI.

Description. License Condition 2.C.5 (Unit 1) and 2.C.10 (Unit 2) require that PSEG implement and maintain the fire protection program as described in the UFSAR and approved in the Safety Evaluation Reports (SERs). The SER dated July 20, 1989, approved specific exemptions from the requirements of Appendix R to 10 CFR 50. For the inner piping penetration area, 1(2)FA-PP-100H, an exemption was granted from the requirement to have an automatic fire suppression system (Licensee Exemption 4). PSEG committed to protect cables associated with one safe shutdown path with a 1-hour fire-rated barrier. No exemptions were requested, or granted, for the Outer Piping Penetration Area, 1(2)FA-PP-92K, or the Turbine Building 1(2)FA-TGA-88.

During a review of SSAR DE-PS.ZZ-0001(Q)-A3-SSAR(067), the team found that SGS relied on a manual operator action, without an approved exemption, to defeat the spurious operation of 12/14MS10 steam generator power operated relief valves for certain fire scenarios in fire area 1(2)FA-TGA-88, Turbine Building. The manual action required is for operators to enter the inner or outer piping penetration area and manually isolate and bleed off control air to close the 12/14MS10 valves in the event that a fire were to cause the spurious opening of the valves. These local manual actions are detailed in Attachment 5 to S1(2).OP-AB.FIRE-0001, Control Room Fire Response.

The SSAR referenced calculation S-C-MS-MEE-1533, "Loss of Main Steam Isolation Components due to an Appendix R Fire in 1(2)FA-PP-92K or 1(2)FA-PP-100H," for an evaluation of the effects of a spurious opening. The calculation identified that a fire in the inner or outer piping penetration areas could affect electrical or pneumatic controls of the MS10 valves. If an electrical fault in the control circuit were to cause an MS10 valve to open, the resulting transient would cause an initial cooldown rate of 300°F per hour. The inspector determined that the cooldown would be terminated when the steam generator boiled dry, or when the SGPORV was successfully closed.

Enclosure

Analysis. The finding adversely impacted post-fire shutdown equipment, and could prevent achieving and maintaining hot shutdown in the post-fire environment. This affected the protection against external factors attribute of the mitigating systems cornerstone objective. The safety significance of this finding was not evaluated, due to the moratorium on inspection of circuit analysis issues.

Enforcement. PSEG did not provide the 1-hour fire-rated barrier for cables for safe shutdown components as specified in the SGS Fire Protection Program and approved by the July 20, 1989 SER. The team concluded that the identified issues concerning potential effects of fire damage on associated circuits related to safe shutdown components met the criteria specified in IP 71111.05, "Fire Protection," for treatment as an unresolved item (URI). Pending completion of the generic resolution of associated circuits issues by NRR and NEI, this finding is identified as URI 50-272/03-02-01, 50-311/03-02-01, Fire Induced Spurious Opening of MS10 Valves.

#### **4. OTHER ACTIVITIES**

##### **4OA2 Identification and Resolution of Problems**

##### **.1 Corrective Actions for Fire Protection Deficiencies**

##### **a. Inspection Scope**

The team reviewed the fire impairments log, fire protection system health reports, open corrective maintenance backlog for fire protection and safe shutdown equipment, selected notifications for fire protection and safe shutdown issues to evaluate the prioritization for resolving fire protection related deficiencies and the effectiveness of corrective actions. The team also reviewed recent quality assurance (QA) audits and fire protection self-assessments of the fire protection program to determine if the PSEG was identifying program deficiencies and implementing appropriate corrective actions.

##### **b. Findings**

No findings of significance were identified.

#### 4OA6 Meetings, Including Exit

##### .1 Exit Meeting Summary

The team presented their preliminary inspection results to Mr. J. Carlin, Vice President of Engineering, Mr. D. Garchow, Vice President of Licensing/Projects and other members of the PSEG staff at an exit meeting on February 28, 2003. PSEG acknowledged the conclusions and observations presented.

The team asked PSEG if any of the information provided during the inspection was proprietary. Proprietary information was identified and returned to PSEG prior to leaving the site. No proprietary information was included in this inspection report.

Enclosure

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee personnel:

W. Buirch	Fire Department
F. Priestley	Salem Operations
D. Schiller	Systems Engineer
D. Shumaker	Fire Protection Engineer
B. Thomas	Licensing
K. Wolf	Engineer, Performance Engineering

#### NRC personnel:

J. Linville	Chief, Electrical Engineering Branch
D. Orr	Senior Resident Inspector, Salem Generating Station

### **LIST OF ITEMS OPENED AND CLOSED**

#### Opened

50-272, 311/03-02-01	URI	Fire Induced Spurious Opening of MS10 Valves (Section 1R05.8)
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#### Closed

None

### **LIST OF DOCUMENTS REVIEWED**

#### Administrative Procedures

NC.DE-PS.ZZ-0001(Q), Programmatic Standard For Fire Protection, Rev. 3  
NC.DE-PS.ZZ-0001(Q)-A1, Salem Fire Protection Report-Technical Standard General, Rev. 2  
NC.DE-PS.ZZ-0001(Q)-A2, Salem Fire Protection Report-Technical Standard Fire Hazards Analysis and Fire Protection Drawings, Rev. 2  
NC.DE-PS.ZZ-0001(Q)-A2-FHA, Salem Fire Hazards Analysis, Rev. 6  
NC.DE-PS.ZZ-0001(Q)-A3, Technical Standard Salem Fire Protection Report-Safe Shutdown Analysis, Rev. 1  
NC.DE-PS.ZZ-0001(Q)-A4, Technical Standard Salem Fire Protection Report-Safe Shutdown Cables, Rev. 1  
NC.DE-PS.ZZ-0001(Q)-A8, Fire Protection Regulatory Review Process, Rev. 0  
NC.DE-PS.ZZ-0001(Q)-GEN, Programmatic Standard Salem Fire Protection Report-General, Rev. 2  
NC.FP-AP.ZZ-0001(Q), Fire Protection Organization, Duties and Staffing, Rev. 3  
NC.FP-AP.ZZ-0005(Q), Fire Protection Surveillance and Periodic Test Program, Rev. 8  
NC.FP-AP.ZZ-0009(Q), Fire Protection Training Program, Rev. 2  
NC.FP-AP.ZZ-0010(Q), Fire Protection Impairment Program, Rev. 6

NC.FP-AP.ZZ-0012(Q), Safe Performance of Hot Work, Rev. 0  
 NC.FP-AP.ZZ-0020(Q), Compensatory Measure Firewatch Program, Rev. 0  
 NC.FP-AP.ZZ-0025(Q), Precautions Against Fire, Rev. 0  
 NC.NA-AP.ZZ-0025(Q), Operational Fire Protection Program, Rev. 6  
 SC.DE-PS.ZZ-0035(Q), Salem Penetration Seal Program, Rev. 0  
 SC.DE-PS.ZZ-0035(Q)-A2, Penetration and Internal Conduit Identification and Labeling, Rev. 0  
 SC.DE-PS.ZZ-0035(Q)-A3, Criteria For Visual Field Inspection of Penetration Seals, Rev. 0  
 SC.DE-PS.ZZ-0035(Q)-A4, Control of Penetration and Internal Conduit Seal Design and Configuration, Rev. 0  
 SC.DE-PS.ZZ-0035(Q)-A7, Penetration Seal SAP Database Control, Rev. 0  
 SC.FP-EO.ZZ-6002(Z), Fire Department Fire Response, Rev. 6

### Safe Shutdown Analysis Reports

DE-PS.ZZ-0001(Q)-A3-SSAR(004), Salem Fire Protection Report - Safe Shutdown Analysis, RHR Pump 11 & Heat Exchanger Area, EL. 45' & 55', 1FA-AB-45A, Rev. 1  
 DE-PS.ZZ-0001(Q)-A3-SSAR(009), Salem Fire Protection Report - Safe Shutdown Analysis, 11 Component Cooling Pump & Heat Exchanger Area, EL. 84', 1FA-AB-84C, Rev. 3  
 DE-PS.ZZ-0001(Q)-A3-SSAR(010), Salem Fire Protection Report - Safe Shutdown Analysis, Reactor Plant Auxiliary Equipment Area, EL. 100', 1FA-AB-100C, Rev. 2  
 DE-PS.ZZ-0001(Q)-A3-SSAR(020), Salem Fire Protection Report - Safe Shutdown Analysis, RHR Pump 21 & Heat Exchanger Area, EL. 45' & 55', 2FA-AB-45A, Rev. 1  
 DE-PS.ZZ-0001(Q)-A3-SSAR(026), Salem Fire Protection Report - Safe Shutdown Analysis, 21 Component Cooling Pump & Heat Exchanger Area, EL. 84', 2FA-AB-84C, Rev. 3  
 DE-PS.ZZ-0001(Q)-A3-SSAR(027), Salem Fire Protection Report - Safe Shutdown Analysis, Reactor Plant Auxiliary Equipment Area, EL. 100', 2FA-AB-100C, Rev. 2  
 DE-PS.ZZ-0001(Q)-A3-SSAR(067), Salem Fire Protection Report - Safe Shutdown Analysis, Common Unit 1 & 2 Volume 067, 1FA-TGA-88, 2FA-TGA-88 & 12FA-SB-100, Rev. 0

### Pre-Fire Plans

FRS-II-411, Salem-Unit 1, (Unit 2) - Pre-Fire Plan, Reactor Plant Auxiliary Equipment Area Elevations: 45' and 55', Rev. 2  
 FRS-II-432, Salem Unit 1, (Unit 2) - Pre-Fire Plan, Spent Fuel/Component Cooling Heat Exchanger and Pump Area Elevation: 84' - 0", Rev. 3  
 FRS-II-442, Salem-Unit 1, (Unit 2) - Pre-Fire Plan, Boric Acid Evaporator Unit and Chemistry Laboratory (Counting Room) Elevation: 100'-0", Rev. 3  
 FRS-II-443, Salem-Unit 1, (Unit 2) - Pre-Fire Plan, Decon Room (ISI Storage Room) and Waste Evaporator Unit Room Elevation: 100'-0", Rev. 3  
 FRS-II-444, Pre-Fire Plan, Demineralizer Ion Exchanger Area Elevation: 100'-0", Rev. 3  
 FRS-II-447, Pre-Fire Plan, Primary Sampling Laboratory Elevation: 110'-0", Rev. 3  
 FRS-III-211, Salem Unit 1, (Unit 2) - Pre-Fire Plan, Turbine Generator Area and Service Building Elevation: 88' - 0", Rev. 4  
 FRS-III-221, Salem Unit 1, (Unit 2) - Pre-Fire Plan, Turbine Generator Area Elevation: 100' - 0", Rev. 3  
 FRS-III-231, Salem Unit 1, (Unit 2) - Pre-Fire Plan, Turbine Generator Area Elevation: 120' - 0", Rev. 4  
 FRS-III-241, Salem Unit 1, (Unit 2) - Pre-Fire Plan, Turbine Generator Area Elevation: 140' - 0", Rev. 4

### Work Orders

951024007, Complete 4 kV Breaker Inspection, Testing and Timing.  
 950622002, Inspect Breakers IAW Maintenance Procedures  
 990830001, Perform As-found Timing on 4kV Breakers IAW Procedure

### Engineering Evaluations and Calculations

EE-08, Fire Barrier Heat Transfer Analysis of RHR Heat Exchanger Equipment Hatches EL.78', September 2, 1987  
 EE-14, Evaluation of The Adequacy of Demineralizer Access Plugs as a Fire Barrier, September 2, 1987  
 EE-15, Fire Barrier Heat Transfer Analysis of The Demineralizer Valve Boxes At EL. 122', September 2, 1987  
 EE-16, Fire Barrier Heat Transfer Analysis of The Ventilation Chase Access Plug at EL. 122' in Response to an ASTM E-119 Fire, September 2, 1987  
 S-C-FBR-FEE-1661, Assessment of Physical Barriers - Fire Areas 1 (2) FA-AB-84C, Rev. 0  
 S-C-FBW-FEE-1609, Evaluation of The Fire Resistance Capability of Ventilation Configurations in 3-Hour Structural Fire Barriers, Rev. 0  
 S-C-M200-MSE-0383, Actuation of Fire Suppression System Causing In-operability of Safety-Related Equipment, Rev. 0  
 S-0-FP-MEE-0756, Salem Generating Station, Units 1 & 2 Fire Pump Piping (As-Built) Configuration Justification, Rev. 3  
 S-2-FP-MEE-1230, Hose Station 2FP230: Hydraulic Analysis To Demonstrate Adequate Flow & Pressure Are Available When Using 150' of 1-1/2 inch Hose, Rev. 0  
 89-033, Hydraulic Analysis of Salem Unit 2 Main Transformer Phase A & B Fire Suppression System Modifications, Rev. 0  
 S-C-CBV-MEE-1510, Rev. 0, Evaluation of Appendix R Safe Shutdown Components and the Capability to Enter Containment as a Result of a Loss of CFCUs, Due to a Fire  
 S-C-CVC-MEE-1514, Rev. 0, Appendix R/Chemical and Volume Control System Makeup and Boration  
 S-C-CC-MEE-1665, Rev. 0, Reduced CCW and SW Flows Post-Appendix R Fire in 1(2)FA-AB-84B  
 S-C-MS-MEE-1533, Rev. 0, Loss of Main Steam Isolation Components Due To An Appendix R Fire in 1(2)FA-PP-92K or 1(2)FA-PP-100H  
 S-C-ZZ-EEE-1430, Rev. 1, Loss of Offsite Power Evaluation For A Postulated Appendix R Fire At Salem Generating Station Units 1&2  
 S-4-SW-EEE-1689, Rev. 0, Service Water Pump Availability From The Control Room For A Postulated Appendix R Fire at the HSD Panel  
 DE-PS.ZZ-0001(Q)-A3, Rev. 1, Salem Fire Protection Report - Safe Shutdown Analysis, Units 1 and 2  
 ES-44.18, Rev. 1, Salem Units 1 and 2 Electrical Coordination for Appendix R Applications  
 ES-1.002(Q), 13.8KV, Rev. 1, 4.16KV & LV Buses Short Circuit Calculation  
 S-C-CAV-MEE-1703, Rev. 0, Effect of Loss of Ventilation on Operation of Safe Shutdown Equipment Served by CAV System - Appendix R Analysis  
 S-C-CBV-MEE-1510, Rev. 0, Evaluation of Appendix R Safe Shutdown Components and the Capability to Enter Containment as a result of a loss of CFCUs, due to Fire



P&IDs

205222 A 8760, Number 1 & 2 Units - Fire Protection , Sheets 1 - 6

Drawings

203794 A 1383, Number 1 & 2 Units - Fire Protection Charcoal Filters Fire Detectors & Deluge Valves, Rev. 5

204802 A 8752, Plan of Generating Facilities, Rev. 8

204803 A 8752, Number 1 & 2 Units - Auxiliary Building EL. 122', Rev.11

204804 A 8752, Number 1 & 2 Units - Auxiliary Building EL. 100', Rev. 8

204805 A 8752, Number 1 & 2 Units - Auxiliary Building EL. 84', Rev. 6

204806 A 8752, Number 1 & 2 Units - Auxiliary Building EL. 64', Rev.4

204807 A 8752, Number 1 & 2 Units - Auxiliary Building EL. 45' & 55', Rev. 2

211361 B 9511, Number 1 Unit - Control Area No. 11 MAC 115 V Distribution Cabinet, Rev. 29

211364 B 9511, Number 1A 115 VAC Vital Instrument Bus, Rev. 22

211370 A 8859, Sh. 1 Number 1 Unit 115 V Control System, Rev. 38

211370 A 8859, Sh. 2 Number 2 Unit 115 V Control System, Rev. 35

240862 A 1543, Number 1 & 2 Units - Wall Ratings For Penetration Sealing- Turbine Building - EL. 84' & 88', Rev. 0

240863 A 1543, Number 1 & 2 Units - Wall Ratings For Penetration Sealing- Turbine Building - EL. 120', Rev. 0

240864 A 1543, Number 1 & 2 Units - Wall Ratings For Penetration Sealing-Turbine Building - EL. 100', Rev. XX

245056 A 1650, Number 2 Unit - Fire Protection Smoke & Fire Detectors, Rev. 5

245057 A 1650, Number 2 Unit - Fire Protection Smoke & Fire Detectors, Rev. 7

245067 A 1650, Number 1 Unit - Fire Protection Smoke & Fire Detectors, Rev. 3

245751 A 1684, Number 1 Unit - Fire Protection Smoke & Fire Protectors, Rev. 1

247911 B 9707, Number 1 & 2 Units-Auxiliary Building 1ASDS & 2ASDS 115 VAC Distribution PNL., Rev. 13

248904 A 1770, No. 1 & 2 Units - Fire Protection Fire Coating Work, Rev. 1

249551 A 1770, Number 1 & 2 Units-Auxiliary Building 1ASDS & 2ASDS Inverter Power Supplies, Rev. 5

249854 B 9807, Shts. 1&2, Number 1 & 2 Unit UHF Radio Communications System Antenna Rack & Repeater Cabinet

601270 A 1244, Number 2 Unit - Fire Protection Smoke & Fire Detectors, Rev. 4

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601608 A 1212, Number 1 & 2 Units - Auxiliary Building - EL. 64' Fire Barriers, Rev. 3

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601610 A 1212, Number 1 & 2 Units - Auxiliary Building - EL. 100' Fire Barriers, Rev. 2

601896 A 1322, Number 1 Unit - Fire Protection Smoke & Fire Protectors, Rev. 1

602101 B 9803, Unit 1&2 Penetration Seal Locations Barrier To Location Drawing Matrix, Rev. 1

602105 A 1314, Unit 1&2 Penetration Seal Locations EL 84' Room Numbering Floor Plan, Rev. 1

602117 B 9803, Shts. 1&2, Unit 1 Penetration Seal Locations Room 15403 EL 84' Control Area # 1 Transformer Bus Room - East Wall

605506 A, Shts. 1 - 7, No. 2 Unit - Electrical Penetration Area EL. 78 Isopmetric S2FBW-2EP-78C-03

241107A9661, Unit 1 PZR Power Relief Stop Valve IPR6 Control Schematics, Sheet 1, Rev 13  
 241107A9661, Unit 1 PZR Power Relief Stop Valve IPR7 Control Schematics, Sheet 1, Rev 14  
 203888B9786, Unit 1 Service Water Intake Isolation Valve 1SW26 Control Schematics, Rev 15  
 220978A9793, Unit 1 Auxiliary Building Service Water Stop Valve 11SW21 Control Schematics, Revision 8  
 211582B4025, Unit 1 CVCS Volume Control Tank First Discharge Stop Valve 1CV40 Control Schematics, Revision 14  
 203828B9773, Unit 1 1A 4160V Vital Bus 15 Service Water Pump Control Schematics, Rev 25  
 223684B9790, Unit 1 1B Diesel Generator Engine-Generator Control Schematics, Revision 28  
 223828B9789, Units 1 & 2 No. 1B & 2B Diesel Generators 230V Vital Control Center Control Schematics, Revision 16  
 203003A8789, Unit 1 460V and 230V Vital and Non-Vital Bus One Line Diagram, Revision 43  
 203002A8789, Unit 1 4160 Vital Bus One Line Diagram, Revision 34  
 211370A8859, Unit 1 115V Control System One Line Diagram, Revision 38  
 228030ABL590, Control Area 22 AC Chiller Motor Control Schematics, Revision 8  
 228031CL3012, Control Area 22 AC Chilled water Pump Motor Control Schematics, Revision 13  
 244083A9679, Unit 2 PZR Power Relief Stop Valve IPR6 Control Schematics, Sheet 1, Rev 18  
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 211507A1384, Unit 2 RHR System Suction Isolation Valve 22SJ44 Control Schematics, Revision 34  
 211505A1384, Unit 2 RHR System Suction Isolation Valve 21SJ44 Control Schematics, Revision 31  
 220988B9793, Unit 2 Penetration Area Service Water Stop Valve 22SW2222 Control Schematics, Revision 10  
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 211578A583, Unit 2 Charging Pump Isolation Valve 2SJ1 Control Schematics, Revision 16  
 203834B9774, Unit 2 2A 4160V Vital Bus 22 Service Water Pump Control Schematics, Rev 22  
 223684B9790, Unit 2 2B Diesel Generator Engine-Generator Control Schematics, Revision 29  
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205485 A 8768, No.1 Unit - Penetration Area Conduits & Trays Below EL 100'-0", Rev. 47  
 205487 A 8768, No. 1 Unit - Penetration Area Conduits & Trays BEL EL 120'-0", Rev. 39  
 205488 A 8768, No. 1 Unit - Penetration Area Conduit Sections & Details BEL EL 120'-0", Rev. 32  
 205489 A 8768, No. 1 Unit-Penetration Area Trays Below EL 100'-0", Rev. 41  
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 208977 A 1289, No. 1 Unit-South Penetration Area Sections and Details, Rev. 16  
 209952 A 8830, No. 1 Unit-South Penetration Area Trays and Conduits, Rev. 20  
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 602143 B 9803, Unit 1 Penetration Seal Locations Room 15403 EL 84' Control Area #1 Transformer Bus Room-South West Wall, Rev. 0  
 602217 B 9803, Unit 1 Penetration Seal Locations Room 15558 EL 100' Mechanical Penetration Area - Floor, Rev. 1

604680, Units 1 & 2 Common Pressure Seal Detail For Spares of Cables Using DC 995 Silicone Caulk, Rev. 0  
 604681, Units 1 & 2 Common Pressure Seal Detail For System Fittings Using Concessive Standard Liquid, Rev. 0  
 SN-1, SE-FOAM In Spare Penetration Thru and/or Pressure Barrier, Rev. 4  
 SN-3, SE-FOAM With Cable Thru and/or Pressure Barrier, Rev. 4  
 SN-49, SF-60 With Cable Tray, Cable, Pipes, Conduits, Instrument Tray or Instrument Lines Thru Fire Barrier, Rev. 1

### Procedures

S1.OP-AB.FIRE-0001(Q), Rev. 0, Control Room Fire Response  
 S2.OP-AB.FIRE-0001(Q), Rev. 0, Control Room Fire Response  
 S1.OP-AB.FIRE-0002(Q), Rev. 0, Fire Damage Mitigation  
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 S1.OP-PT.HSD-0001(Q), Rev. 7, Instrumentation - Remote Shutdown Panel  
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 S1.FP-PM.LTS-0039(Q), Appendix R Self-Contained, Battery Powered Emergency Light Unit Inspection & Preventive Maintenance, Rev. 8  
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 S1.OP-AB.CR-0002(Q), Rev. 13, Control Room Evacuation Due To Fire In The Control Room, Relay Room, 460/230V Switchgear Room, or 4KV Switchgear Room  
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 SC.OP-SO.SW-0008(Q), Rev/ 0, Service Water Test-Line Cross-Connect Alignment  
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 S1.OP-AB.CAV-0001(Q), Rev. 0, Loss of Unit 1 Control Area HVAC  
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 SC.MD-ST.230-0001(Q), Rev. 16, 230 V and 460 V ITE K-Series Breaker Overload Test  
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SC.FP-ST.FS-0006(Q), Fire Pump Capacity Test, Rev. 9 Completed December 2, 2000 & June 2, 2002

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SC.FP-SV.FBR-0026(Q), Flood and Fire Barrier Penetration Seal Inspection, Rev. 2 Completed July 23, 2002

SC.FP-SV.FS-0003(Q), Fire Water Flowpath Verification, Rev. 4 Completed January 28, 2002 & December 26, 2002

SC.FP-SV.FS-0036(Q), Class 1 Fire Hydrant Inspection, Rev. 2 Completed December 10, 2002 & January 7, 2003

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S1.FP-PM-0022(Z), Class I Fire Hose Station Visual Inspection, Rev. 5 Completed December 6, 2002 & January 6, 2003

S1.FP-PM-FS-0023(Z), Fire Hose Station Detailed Inspection, Rev. 1 Completed November 5, 2001 & December 12, 2002

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S1.FP-PT.FS-0017(Z), Non Class 1 Deluge System Functional Test & Inspection, Rev. 2 Completed November 18, 2001, October 20, 2002 & December 9, 2002

S1.FP-PT.FS-0025(Z), Triennial Fire Hose Service Test, Rev. 1 Completed November 17, 2001

S1.FP-PT.FS-0024(Z), Fire Hose Station Flow Verification, Rev. 0 Completed June 24, 2001

S1.FP-PT.FS-0034(Z), Wet & Dry Pipe Sprinkler System Functional Test & Inspection, Rev. 0 Completed September 21, 2001 & September 20, 2002

S1.FP-ST.FBR-0028(Q), Class 1 Fire Damper Operability Test, Rev. 2 Completed October 10, 2002

S1.FP-ST.FD-0029(Q), Functional Test of Class 1 Smoke & Thermal Detectors, Rev. 6 Completed October 4, 2002

S1.FP-ST.FS-0009(Q), Number 1 Diesel Fire Pump Operability Test, Rev. 14 Completed December 27, 2002

S1.FP-ST.FS-0016(Q), Class 1 Pre-Action Sprinkler System Functional Test & Inspection, Rev. 2 Completed April 3, 2001 & March 4, 2002

S1.FP-ST.FS-0034(Q), Charging/Safety Injection Pumps Area Wet Pipe Sprinkler System Functional Test and Inspection, Rev. 1 Completed May 8, 2001 & March 11, 2002

S1.FP-SV.FBR-0005(Q), Fire Wrapped Cable, Conduit and Cable Tray Inspections, Rev. 0 Completed May 14, 2000 and October 30, 2001

S1.FP-SV.FBR-0027(Q), Class 1 Fire Door Inspection and Operability Test, Rev. 1 Completed January 22, 2002 & July 23, 2002

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S1.FP-SV.FBR-0056(Q), Fire and HELBA/MELBA Barrier Inspection, Rev. 3 Completed December 7, 2000 and March 26, 2002

S1.FP-ST.FD-0030(Q), Class 1 Smoke & Thermal Detector Circuit Operability Test, Rev. 2 Completed June 2, 2002 & November 17, 2002

S1.FP-ST.LTS-0039(Q), Appendix R Self Contained, Battery Powered Emergency Light Unit Inspection and Preventive Maintenance, Rev. 7 Completed June 6, 2002 & December 21, 2002

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S2.FP.PT.FD-0040(Z), Fire Alarm Pull Box Functional Test, Rev. 2 Completed May 29, 2002 & November 29, 2002

S2.FP-PT.FS-0017(Z), Non Class 1 Deluge System Functional Test & Inspection, Rev. 2 Completed October 6, 2001 & October 20, 2002

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S2.FP-ST.FS-0025(Q), Triennial Fire Hose Service Test, Rev. 2 Completed June 26, 2001 & December 15, 2001

S2.FP-ST.FS-0034(Q), Charging/Safety Injection Pumps Area Wet Pipe Sprinkler System Functional Test and Inspection, Rev. 1 Completed February 9, 2001 & January 15, 2002

S2.FP-ST.FS-0075(Q), Panel 335 Dry Pipe Sprinkler System Functional Test and Inspection, Rev. 2 Completed May 9, 2001, May 2, 2002 & October 20, 2002

S2.FP-SV.FBR-0005(Q), Fire Wrapped Cable, Conduit and Cable Tray Inspections, Rev. 0 Completed July 26, 2000

S2.FP-SV.FBR-0027(Q), Class 1 Fire Door Inspection and Operability Test, Rev. 1 Completed May 29, 2002 & November 3, 2002

S2.FP-SV.FBR-0031(Q), Class 1 Fire Damper Visual Inspection, Rev. 2 Completed February 8, 2001 & July 12, 2002

S2.FP-SV.FBR-0056(Q), Fire and HELBA/MELBA Barrier Inspection, Rev. 3 Completed April 7, 2002

S2.FP-ST.FD-0029(Q), Functional Test of Class 1 Smoke & Thermal Detectors, Rev. 7 Completed May 28, 2002 & November 16, 2002

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#### Design Change Packages (DCPs)

80023525, Installation Instructions for Appendix R Emergency Lighting Units (ELUs) in Salem Unit 1, Rev. 0

80030039, Installation Instructions for Appendix R Emergency Lighting Units (ELUs) in Salem Unit 2, Rev. 0

80031273, Electrical Raceway Fire Barrier Project - Fire Barrier Systems - 2EP78C-03, 2EP78C-06 and 2EP78C-07, Rev. 1

Specification No. S-C-ZZ-NOS-0388, Installation of 3M Interam E-50 Series Electrical Raceway Fire Barriers for Salem Generating Station Units 1 & 2, Rev. 4

80045583, Rev. 1, Salem Unit 1 Service Water and EDG Circuit Changes - Hot Shorts

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80029445, Electrical Raceway Fire Barrier Project - Fire Barrier Systems 1EP78C-01, 1EP78C-02, and 1EP78C-05

80008744, Rev. 1, Appendix R 230 VAC Vital Swgr/MCC Coordination Modifications, Unit 1

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#### Safety Evaluation Reports & Exemptions

Safety Evaluation Report, Fire Protection Review, November 20, 1979

September 16, 1982, Letter to PSE&G, Salem Nuclear Generating Station, Unit Numbers 1 & 2, Fire Protection-Request for Exemption From Requirements of Appendix R to 10 CFR 50, Section III.G

June 17, 1983, Letter to PSE&G, Salem Nuclear Generating Station, Unit 1, Fire Protection-Request for Exemption From Requirements of Appendix R to 10 CFR 50, Section III.G

July 20, 1989, Letter to PSE&G, Salem Nuclear Generating Station, Unit Numbers 1 & 2, Fire Protection-Exemption From Requirements of Appendix R (Fire Protection)

June 20, 2002, Letter to PSE&G, Salem Nuclear Generating Station Unit Numbers 1 & 2, Request For Additional Information RE: Request For Exemption From NRC Regulations For Fire Areas 1(2)-FA-AB-64B, 1(2)-FA-AB-84B, 1(2)-FA-AB-84C

August 15, 2002, Letter to NRC, Reply to Request For Additional Information Regarding Request For Exemption From 10 CFR 50, Appendix R, For Fire Areas 1(2)-FA-AB-64B, 1(2)-FA-AB-84C, & 1(2)-FA-AB-84B Salem Generating Station, Units 1 & 2

#### Fire Department Qualifications & Training Documents

Fire Department Qualifications Training, 2002

#### Fire Drills

Off-Site Assistance Drill, December 23, 2002

UAD-1-4, 84 Switchgear Unit 1, December 15, 2002

UAD-2-4, 84 Switchgear Unit 2, December 3, 2002

UAD-3-4, 84 Switchgear Unit 2, December 17, 2002

### Lesson Plans

Emergency Worker Training Program Instructions Handbook, 1995

NTLP-BNFF-AHOS-C, Fire Protection Training-Basic Nuclear Fire Fighting-Advanced  
Hoselines, January 20, 2000

NTLP-BNFF-BA1-C, Fire Protection Training-Basic Nuclear Fire Fighting-SCBA 1, January 6,  
2000

NTLP-BNFF-BA2-C, Fire Protection Training-Basic Nuclear Fire Fighting-SCBA 2, January 6,  
2000

NTLP-BNFF-DETEC-C, Fire Protection Training-Basic Nuclear Fire Fighting-Fire Detection,  
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NTLP-BNFF-FBEHA-C, Fire Protection Training-Basic Nuclear Fire Fighting-Fire Fighting  
Behavior, February 15, 2000

NTLP-BNFF-FC1-C, Fire Protection Training-Basic Nuclear Fire Fighting-Fire Control 1,  
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NTLP-BNFF-FFPPE-C, Fire Protection Training-Basic Nuclear Fire Fighting-Personal Protective  
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NTLP-BNFF-HANDH-C, Fire Protection Training-Basic Nuclear Fire Fighting-Hose Handling,  
February 20, 2000

NTLP-BNFF-HOSE-C, Fire Protection Training-Basic Nuclear Fire Fighting-Fire Hose Basics,  
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NTLP-BNFF-NPP, Fire Protection Training-Basic Nuclear Fire Fighting-FSprinkler Systems,  
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NTLP-BNFF-PEXT-C, Fire Protection Training-Basic Nuclear Fire Fighting-Portable  
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NTLP-BNFF-R&K-C, Fire Protection Training-Basic Nuclear Fire Fighting-Ropes & Knots,  
January 17, 2000

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Safety, February 15, 2000

NTLP-BNFF-SPRIN-C, Fire Protection Training-Basic Nuclear Fire Fighting-Sprinkler Systems,  
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NTLP-BNFF-SSC, Fire Protection Training-Basic Nuclear Fire Fighting-Site Specific; Fire  
Hazards, Plans and Procedures, April 26, 2000

NTLP-BNFF-STRMS-C, Fire Protection Training-Basic Nuclear Fire Fighting-Fire Streams,  
February 13, 2002

### Corrective Action Program Documents

#### Notifications

20028443	20079194	20085046	20086840	20089378	20089638
20092173	20092857	20094824	20097421	20100334	20101608
20107201	20110533	20120847	20121689	20126193	20126194
20126195	20132080*	20132125*	20132161*	20132400	20132920*
20133176*	20133495*				

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#### Penetration Seal Qualification Test Reports

BISCO Test Report 748-134, Utilizing BISCO SF-20 and BISCO SE-FOAM, May 14, 1984  
 BISCO Fire Test 748-244, Three Hour Fire Test of Multiple Penetrants Sealed With 7 ½" of  
 BISCO SF-60 Elastomer, September 8, 1999

#### Fire Wrap Qualification Tests

PSBP Number 324959, 1 Hour Fire Test Phase II, Test Number 1, March 28, 2001  
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#### Fire Damper Qualifications Tests

VTD No. 304068, Supplemental Control Dampers, October 25, 1995  
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 February 24, 1994

#### Quality Assurance Audits and Self-Assessments

Quality Assessment Onsite Independent Review & Corrective Action Program Quarterly  
 Reports for 2000, 2001 & 1<sup>st</sup> three quarters of 2002  
 Self-Assessment - Fire Pump House - Salem, April 4, 2002  
 Fire Department Self-Assessment - Double Fire Doors, April 9, 2002  
 Self Assessment - Compressed Gas Cylinders, 2002  
 Fire Protection Self-Assessment - Fire Watch Training, June 30, 2002  
 Ongoing Self-Assessment report Emergency Lighting Unit Testing, June 28, 2002  
 Fire Protection Operations Self-Assessment - The Fire Impairment Tracking Log, September  
 13-17, 2002

#### Transient Combustible Permits

TCPR-S010603-3, January 6, 2003  
 TCPR-S010703-01, January 7, 2003  
 TCPR-S010703-02, January 7, 2003  
 TCPR-S012403-01, January 24, 2003  
 TCPR-S012403-02, January 24, 2003  
 TCPR-S010603-03, January 6, 2003  
 TCPR-S010703-01, January 7, 2003

#### Miscellaneous Documents

Salem Generating Station Updated Final Safety Analysis Report  
 Fire Protection System Health Report, Salem Unit 1, October 1, 2002 - December 31, 2002  
 Fire Protection System Health Report, Salem Unit 2, October 1, 2002 - December 31, 2002  
 Fire Protection System Health Report, Salem Unit 1, October 1, 2001 - December 31, 2001  
 Hot Work Authorization Log For Salem  
 Light Guard F100/F85 - Emergency Light Unit Technical Manual



Light Guard B200G/B170G - Emergency Light Unit Technical Manual  
 Light Guard LEC-36 Sealed Lead Calcium Battery Technical Manual  
 Transient Combustibles In Safety Related Areas, Impairment Log for Unit 1 & Unit 2, November  
 2002 - January 2003

### **LIST OF ACRONYMS USED**

CFR	Code of Federal Regulations
ELU	Emergency Lighting Unit
ERFBS	Electrical Raceway Fire Barrier System
FHA	Fire Hazards Analysis
IP	Inspection Procedure
IPEEE	Individual Plant Examination of External Events
NEI	Nuclear Energy institute
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
PSEG	Public Service Electric Gas
P&ID	Piping and Instrumentation Drawing
QA	Quality Assurance
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SER	Safety Evaluation Report
SGPORV	Steam Generator Power Operated Relief Valve
SGS	Salem Generating Station, Units 1 and 2
SSAR	Safe Shutdown Analysis Report
SSC	Structures, Systems, Components
TBD	To Be Determined
URI	Unresolved Item