

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Salem Generating Station - Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 1 1	PAGE (3) 1 OF 07
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TITLE (4)
Appendix R Criteria Non-Conformance

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
06	19	87	87	009	02	08	12	87	Salem Unit 1	0 5 0 0 0 2 7 2
										0 5 0 0 0

OPERATING MODE (9) POWER LEVEL (10) N/A	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)				
	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.406(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)	
	<input type="checkbox"/> 20.406(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)	
	<input type="checkbox"/> 20.406(a)(1)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)	
	<input type="checkbox"/> 20.406(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(i)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
	<input type="checkbox"/> 20.406(a)(1)(iv)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)		
	<input type="checkbox"/> 20.406(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)		

LICENSEE CONTACT FOR THIS LER (12)

NAME M. K. Gray - Licensing Engineer	TELEPHONE NUMBER AREA CODE: 6 0 9 3 3 9 - 4 3 7 0
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15) MONTH: DAY: YEAR:
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

The following system/component conditions were discovered by a PSE&G task force established to review and evaluate Salem Station's compliance with the requirements of 10CFR 50 Appendix R.

LER 311/87-009-00 addressed a SW System cabling Appendix R separation criteria inadequacy discovered June 19, 1987. The root cause was inadequate design review. The current design meets the original electrical separation criteria, but not the Appendix R criteria. PSE&G is reviewing design change options to correct this deficiency.

LER 311/87-009-01 addressed non-seismically qualified Marinite walls located in Salem Units 1 & 2 460V Switchgear Room discovered June 25, 1987. The Marinite walls have been reinforced to seismic criteria. The existing design control procedures incorporate multi-discipline cross checks and system interaction considerations. A sample of design changes installed before implementation of these design control procedures is being conducted.

This LER Supplement addresses RHR Room Coolers {VF} cabling Appendix R inadequacies and control cabling Appendix R inadequacies for RHR Room Coolers, Charging Pump Room Coolers {VF} and Diesel Generator Fuel Oil Transfer Pumps {DC} identified on July 17, 1987. The root cause of these Appendix R inadequacies is inadequate design review. In both cases, an hourly roving fire watch patrol was established for the respective areas. A design change correcting these deficiencies will be made.

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PLANT AND SYSTEM IDENTIFICATION:

Westinghouse - Pressurized Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as {xx}

IDENTIFICATION OF OCCURRENCE:

Appendix R Criteria Non-Conformance

Discovery Date: 06/19/87

Report Date: 08/12/87

This report was initiated by Incident Report No. 87-241 & 87-256

CONDITIONS PRIOR TO OCCURRENCE:

N/A

DESCRIPTION OF OCCURRENCE:

The following plant system/component conditions were identified by a Public Service Electric & Gas (PSE&G) task force established to review and evaluate Salem Station's compliance with the requirements of 10CFR 50 Appendix R. The original LER (paragraphs designated "A") dealt with a design configuration problem associated with Salem Unit 2's Service Water System electrical cabling. The first supplement (paragraphs designated "B") addresses a wall constructed to act as a fire barrier but its design did not fully address seismic criteria concerns. This supplement addresses Residual Heat Removal (RHR) Room Coolers {VF} cabling concerns (paragraphs designated "C") and control cabling concerns for RHR Room Coolers, Charging Pump Room Coolers {VF} and Diesel Generator Fuel Oil Transfer Pumps {DC} (paragraphs designated "D").

"A" On June 19, 1987 at 1515 hours, it was discovered that the cabling for the three (3) electrical trains of the Unit 2 Service Water (SW) System {BI} did not meet the separation requirements of the Code of Federal Regulations, 10CFR 50 Appendix R. These cables are located in the SW Pipe Tunnel located between the Auxiliary Building and the SW Intake Structure. Upon discovery, a continuous fire watch was established at the entrance to the SW Pipe Tunnel. The fire watch periodically walks down the length of the tunnel. This discovery was reported to the Nuclear Regulatory Commission by telephone on June 19, 1987 at 1530 hours in accordance with the requirements of 10CFR 50.72(b)(2)(iii)(D).

"B" On June 25, 1987 it was discovered that a Marinite wall located in the Salem Unit 1 460V Switchgear Room (84' Elevation) was not seismically qualified. If a seismic event occurred a possibility

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DESCRIPTION OF OCCURRENCE: (cont'd)

existed that the wall could have failed causing damage to the 460V Vital Bus Switchgear. This wall configuration also existed for Salem Unit 2.

"C" On July 17, 1987 at 1600 hours, it was identified that the cabling for redundant trains of Unit 2 RHR Room Coolers do not meet the requirements of 10CFR 50 Appendix R, Subsection III(G). These cables are located in a common panel in the Reactor Plant Auxiliary Equipment Area, Elevation 64 (Fire Area 2FA-AB-64B). A postulated fire in this area could damage these cables resulting in the loss of both RHR Room Coolers. In addition, damage to these cables could prevent the RHR Room Ventilation Supply and Exhaust Dampers {VF} from opening. This discovery was reported to the Nuclear Regulatory Commission on July 17, 1987 at 1615 hours pursuant to 10CFR 50.72(b)(2)(iii)(B).

"D" On July 17, 1987 at 1600 hours, it was identified that the cabling located in the Unit 2 Upper Electrical Penetration Area, Elevation 100', (Fire Area 2FA-EP-100G) does not meet the separation requirements of 10CFR 50 Appendix R. These cables run from the Safeguards Equipment Cabinets (SECs) to the Vital Ventilation Control Centers. If a postulated fire occurred in the Upper Electrical Penetration Area, the possibility exists to damage control cabling for both RHR Room Coolers, both Charging Pump Room Coolers, and one (1) Diesel Generator Fuel Oil Transfer Pump. This equipment is necessary to achieve and maintain a safe shutdown of the plant. This discovery was reported to the Nuclear Regulatory Commission on July 17, 1987 at 1615 hours pursuant to 10CFR 50.72(b)(2)(iii)(A).

APPARENT CAUSE OF OCCURRENCE:

"A" The root cause of the SW cabling configuration deficiency is inadequate design review. The current design meets the original electrical separation requirements for Salem Station Unit 2, however, it does not meet the 10CFR 50 Appendix R requirements as published in the Federal Register on September 8, 1981. The Appendix R criteria was not applied to the SW Piping Tunnel because of its restricted access and confined space. Due to this oversight, the SW Pump cabling configuration was not modified.

"A" 10CFR 50 Appendix R, Section G(2) requires cables and equipment of redundant trains of systems necessary to achieve and maintain hot shutdown be protected by one of three (3) options to ensure that one redundant train is free from fire damage. The three (3) options are: (1) separation of cables and equipment of redundant trains by a three (3) hour fire barrier; (2) separation of cables and equipment of redundant trains by a horizontal distance of more than twenty (20) feet with no intervening combustible or fire hazards along with fire detection and an automatic fire suppression system in the area; or (3) enclosure of cables and equipment of one redundant train in a one hour rated fire barrier along with fire detectors and an automatic

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APPARENT CAUSE OF OCCURRENCE: (cont'd)

fire suppression system in the area. The current design does not meet any of these options.

"B" The root cause of the Marinite wall seismic qualification concern is inadequate design review and documentation. The Marinite walls were installed in January 1981 to provide a fire barrier between redundant safety related components. Although the recent walkdown of the walls, by structural engineers, revealed the walls to have substantial structural support, it was not clear whether seismic requirements were fully considered in the original design and construction of the walls since documentation of the construction appeared inadequate. Subsequent engineering evaluation of the wall(s) revealed that two of the walls (one per Unit) did not meet seismic requirements since their failure could degrade safety-related equipment.

"C" The root cause of the RHR Room Cooler cabling deficiency was inadequate design review. The current cabling configuration meets the original plant design criteria in effect prior to the issuance of 10 CFR50 Appendix R. The cabling configuration was not included in the fire protection upgrade made pursuant to the issuance of 10 CFR50 Appendix R in September 1981.

"C" 10 CFR50 Appendix R, Subsection III(G) requires fire protection features be provided for systems important to safe shutdown. These features should be able to limit fire damage so systems necessary to achieve and maintain cold shutdown can be repaired within 72 hours. The subject cables are located in Auxiliary Building HVAC Electrical Panel 119 in Fire Area 2FA-AB-64B. A fire in this area could cause both RHR Room Coolers to become inoperable and concurrently keep the RHR Room HVAC dampers in the closed position. This would degrade the performance of the RHR Pumps, which are necessary to achieve cold shutdown. To meet these Appendix R requirements, it would be necessary to either: (1) separate the cables with appropriate fire barriers, (2) have Alternate Shutdown Instructions and dedicated materials to ensure that repairs are made within 72 hours of the fire, or (3) obtain NRC approval for an Appendix R exemption in this area. None of these requirements are currently met.

"D" The root cause of the control cabling deficiency for Fire Area 2FA-EP-100G is inadequate design review. The current cabling configuration meets the original plant design criteria in effect prior to the issuance of 10 CFR50 Appendix R. The cabling configuration was not included in the fire protection upgrade made pursuant to the issuance of 10 CFR50 Appendix R. 10CFR 50 Appendix R, Subsection III(G) identifies acceptable cable separation and fire barrier options that ensure one train of systems, necessary to achieve and maintain hot shutdown remain free from fire damage during a postulated fire. The current cable design does not incorporate any of these options.

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ANALYSIS OF OCCURRENCE:

"A" The SW System supplies cooling water to both safety related and non-safety related heat loads. The system utilizes six (6) pumps. The 4.16 KV Vital Busses (trains A, B, and C) provide power to two (2) SW Pumps per bus. The cabling for these trains runs through the SW Pipe Tunnel to the SW Intake Structure. These cables do not meet Nuclear Regulatory Commission 10CFR 50 Appendix R separation criteria (for Fire Protection). If a fire were to occur in this area a possibility exists of damaging all SW Pump electrical trains, thereby losing all SW flow. The Unit could be maintained in Hot Standby (Mode 3), which is a subcritical mode.

"A" While SW Pump Cabling does not meet 10CFR 50 Appendix R separation criteria for fire protection, it does meet the separation criteria to which Unit 2 was originally licensed. The cabling is separated by a horizontal distance of approximately five (5) feet. Also, there is an unrated partial wall between two of the three SW Pump cables. The combustible loading in the area is only approximately six (6) minutes of burn time. Also, access to the SW Pipe Tunnel is restricted, thereby limiting the possibility of adding uncontrolled combustible material to the area. Therefore, it is unlikely a fire would occur that could impair all SW Pump cabling.

"A" The inadequate separation of the SW cabling discovery was reported in accordance with 10CFR 50.72(b)(2)(iii)(D) within four (4) hours of discovery (at 1530 hours). Also, this discovery was reported in accordance with Nuclear Regulatory Commission 10CFR 50.73(a)(2)(v)(D) via Licensee Event Report 311/87-009-00.

"B" The Marinite walls are located in the Units 1 & 2 460V Switchgear Rooms on 84' Elevation. The 1B(2B) 460V Vital Bus Panel parallels the Marinite wall(s) with an intervening distance of approximately four (4) feet. The eight (8) foot high walls consist of two 4' panels. During a seismic event, it is possible for the upper panel to fail, damaging the 1B(2B) 460V Vital Bus Switchgear. The Switchgear supplies power to a variety of safety related equipment including Nos. 12(22) & 14(24) Containment Fan Coil Units (CFCU's), No. 12 Hydrogen Recombiner, and the No. 12 Auxiliary Building Ventilation Supply and Exhaust Fans. This equipment would become inoperable if 1B(2B) Vital Bus was rendered inoperable during a seismic event. Nos. 13(23) and 15(25) CFCU's receive power via No. 1C(2C) electrical train. Additionally, 1C(2C) electrical train supplies power to one Containment Spray (CS) Pump. The limiting case involves the postulated seismic event resulting in the loss of 1B(2B) 460V Vital Bus Switchgear concurrent with a single "active failure" of the 1C(2C) electrical train. This would result in only one (1) operable CFCU and one (1) operable CS Pump. During a design base LOCA, the minimum combination of three (3) CFCU's and one (1) CS Pump is necessary to maintain post-accident Containment pressure below design values. This requirement would not be met if the above scenario is assumed. However, this analysis is based upon the conservative assumption that the Marinite wall failure during a seismic event would result in the complete loss of the 1B(2B) 460V

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ANALYSIS OF OCCURRENCE: (cont'd)

Vital Bus Switchgear. The steel cabinet housing this bus provides a significant degree of protection for the Bus. Furthermore, it is possible the damage to this Bus would not necessarily result in the loss of power to all components powered from this Bus.

"B" Due to the low probability of the combination of events occurring consistent with the conservative assumption made above, the Marinite wall seismic concern did not adversely impact the health and safety of the general public. However, it is being reported in accordance with 10CFR 50.73(a)(2)(vi) as a design inadequacy.

"C" The Auxiliary Building HVAC Electrical Panel 119 contains solenoid valves SV-784 and SV-785 and associated cabling controlling the operation of Nos. 21 and 22 RHR Room Coolers. These solenoid valves are de-energized when either RHR Pump is required to run. RHR Pump Room HVAC dampers 2ABV27 and 2ABV28 fail open when the solenoid valves are de-energized, thereby ensuring circulation of building ventilation air in the room when either RHR Pump is operating. If a fire occurred in this area, it is possible to hot short the cabling to both RHR Room Coolers and blow the control fuses in the RHR Room Cooler control circuit. This would result in the loss of both RHR Room Coolers. The potential further exists for the solenoid valves to remain energized while the RHR Pumps are running, causing dampers 2ABV27 and 2ABV28 to remain closed thereby preventing circulation of ventilation air to the room. Procedurally, operators are instructed to declare the equipment in the RHR Rooms inoperable if the ambient temperature exceeds 125°F. These limits could be exceeded in a short time given the above scenario. Furthermore, without "Alternate Shutdown Instructions" and dedicated material on hand, it cannot be assumed that the coolers could be repaired within 72 hours after the postulated fire.

"D" During accident conditions coincident with a Loss of Offsite Power or 4KV Bus undervoltage signal, the SECs start and connect the Diesel Generators (D/Gs) to the vital buses and sequentially start required safeguards equipment. During the automatic SEC loading sequence, safeguards equipment not required in the short term is blocked from automatically operating to avoid overloading the D/Gs. Upon completion of the automatic loading sequence, the plant operator resets the SECs allowing control of additional equipment needed to assist in the safe shutdown of the plant in the long term. This equipment includes the RHR Room Coolers, the Charging Pump Room Coolers, and the D/G Fuel Oil Transfer Pumps. This equipment receives signals from the SECs via cables 2RP65-AT, 2RP129-BT, and 2RP148-CT which run from 2A, 2B, and 2C SECs to 2A, 2B, and 2C Ventilation Control Centers in Fire Area 2FA-EP-100G. A fire occurring in the Upper Electrical Penetration Area could damage these cables thereby creating the possibility of not powering up this equipment when called upon. The RHR and Charging Pump Room Coolers ensure the ambient room temperature does not exceed RHR Pump or Charging Pump design limits, however, Auxiliary Building ventilation air would still be available to limit ambient temperature. The D/G

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ANALYSIS OF OCCURRENCE: (cont'd)

Fuel Oil Transfer Pumps transfer oil from the D/G Storage Tanks to the D/G Day Tanks. Due to the recent modification to the electrical "D" controls for the D/G Fuel Oil Transfer Pumps described in Unit 1 LER 272/87-010-00, only one D/G Fuel Oil Transfer Pump would be locked out during the SEC manual loading sequence.

CORRECTIVE ACTION:


Upon discovery of the SW Electrical Trains configuration in the SW Pipe Tunnel, a continuous fire watch was established at the entrance "A" to the SW Pipe Tunnel. The fire watch periodically walks down the length of the tunnel. PSE&G is reviewing design modification options to correct this deficiency.

The Marinite walls were reinforced prior to confirmation of their inadequate seismic design. The walls are now qualified to withstand a design base seismic event without degrading adjacent safety related equipment. The Systems Analysis Group currently performs a safety/non-safety system and component interaction review of design "B" changes. This review precludes design inadequacies of this nature. Also, the existing design control procedures incorporate multi-discipline cross checks and system interaction considerations. A sample of design changes installed prior to the implementation of these design control procedures will be conducted to confirm this discrepancy is an isolated occurrence.

Upon discovery of the RHR cabling deficiency, a roving hourly fire watch was established (both Units) for the Reactor Plant Auxiliary "C" Equipment Area. A design change, meeting the requirements of 10 CFR50 Appendix R, will be implemented based on the recommendations of the Fire Protection Task Force.

Upon discovery of the SEC deficiency, a roving hourly fire watch was established (both Units) in the Upper Electrical Penetration Area. A "D" design change, meeting the requirements of 10 CFR50 Appendix R, will be implemented based on the recommendations of the Fire Protection Task Force.

The Fire Protection Task Force is continuing its review. If the Task Force identifies other reportable 10CFR 50 Appendix R deficiencies, in the course of its review, they will be incorporated into this Licensee Event Report as a "supplemental" report.


General Manager -
Salem Operations

MJP:pc

SORC Mtg. 87-061



Public Service Electric and Gas Company P.O. Box E Hancocks Bridge, New Jersey 08038

Salem Generating Station

August 12, 1987

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Dear Sir:

SALEM GENERATING STATION
LICENSE NO. DPR-75
DOCKET NO. 50-311
UNIT NO. 2
LICENSEE EVENT REPORT SUPPLEMENT 87-009-02

This supplemental Licensee Event Report is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(v). This report addresses two additional 10CFR 50 Appendix R inadequacies. This report has been issued within thirty (30) days of the discovery of these additional inadequacies.

Sincerely yours,

A handwritten signature in cursive script that reads "J. M. Zupko, Jr.".

J. M. Zupko, Jr.
General Manager-
Salem Operations

MJP:pc

Distribution

The Energy People

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