

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Salem Generating Station - Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 2 7 2	PAGE (3) 1 OF 0 5
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TITLE (4)
Potentially Inadequate Breaker Coordination

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)
09	17	87	87	011	00	10	16	87	Salem Unit 2		0 5 0 0 0 3 1 1
									0 5 0 0 0		

OPERATING MODE (9) N/A	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																	
POWER LEVEL (10)	20.402(b)	20.408(a)(1)(i)	20.408(a)(1)(ii)	20.408(a)(1)(iii)	20.408(a)(1)(iv)	20.408(a)(1)(v)	20.408(a)	80.38(a)(1)	80.38(a)(2)	80.73(a)(2)(i)	80.73(a)(2)(ii)	80.73(a)(2)(iii)	80.73(a)(2)(iv)(A)	80.73(a)(2)(iv)(B)	80.73(a)(2)(v)	73.71(b)	73.71(a)	OTHER (Specify in Abstract below and in Text, NRC Form 308A)

LICENSEE CONTACT FOR THIS LER (12)									
NAME M. K. Gray - Licensing Engineer							TELEPHONE NUMBER 6 0 9 3 3 9 - 4 3 7 0		

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)							EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO											

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On September 17, 1987 at 2000 hours, it was determined that breaker coordination could not be shown to be documented for several voltage levels in either Salem Unit 1 or Unit 2. This conclusion is based on a draft report of an evaluation of protective relaying of vital busses with respect to the requirements of 10CFR 50 Appendix R. There is a possibility that circuits associated with non-shutdown loads damaged by a postulated fire could cause the loss of power to shutdown equipment fed from separate vital busses. The root cause has not been determined. Investigations are continuing to identify the historical breaker coordination basis and to establish the adequacy of the current configuration. Root cause will be identified based upon the results of these investigations. Results are expected by the end of December 1987. Actions taken until completion of the breaker coordination study includes establishment of fire watches where postulated fires could potentially damage redundant vital cabling.

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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:

Inadequate Breaker Coordination

Event Date: 09/17/87

Report Date: 10/16/87

This report was initiated by Incident Report No. 87-348.

CONDITIONS PRIOR TO OCCURRENCE:

N/A

DESCRIPTION OF OCCURRENCE:

On September 17, 1987 at 2000 hours, it was determined that breaker coordination could not be shown to be documented for several voltage levels in either Salem Unit 1 or Unit 2. This conclusion is based on a draft report of an evaluation of protective relaying of vital busses with respect to the requirements of 10CFR 50 Appendix R. There is a possibility that circuits associated with non-shutdown loads damaged by a postulated fire could cause the loss of power to shutdown equipment fed from the same vital bus. Pursuant to the requirements of 10CFR 50.72(b)(2)(iii)(A), a "four hour report" to the NRC was made on September 17, 1987 at approximately 2100 hours.

APPARENT CAUSE OF OCCURRENCE:

Investigations are continuing to identify the historical breaker coordination basis and to establish the adequacy of the current configuration. Root cause will be identified based upon the results of these investigations.

Appendix R Subsections III(G) and III(L) require protection of redundant safe shutdown cabling, including associated circuits. Fire damage to circuits includes the consideration of hot shorts, open circuits, and shorts to ground. Appendix R requires protection to the extent that fire damage to the cabling of non-shutdown equipment will not result in the loss of power to redundant shutdown equipment. This protection could be provided by either breaker coordination or physical separation and fire protection measures. Since breaker coordination cannot be shown to be documented and fire protection measures are not provided for the subject non-shutdown equipment cabling, associated circuits damaged in a postulated fire could result in the loss of redundant equipment required for hot shutdown.

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ANALYSIS OF OCCURRENCE:

Appendix R fire protection requirements are only applicable to cabling and equipment necessary for safe shutdown of the plant. However, associated cabling for non-safe shutdown equipment that is fed from a common bus must also be considered because fire damage to this cabling could result in the loss of power to safe shutdown equipment. Breaker coordination precludes this possibility by ensuring the overcurrent protection device immediately upstream from a fault, caused by a postulated fire, opens before any breaker further upstream. Thus the electrical loads that are isolated due to the fault are only those loads fed from the lower tier breaker. Without breaker coordination, the possibility exists that a line fault in cabling that does not feed safe shutdown equipment could result in a breaker opening upstream, thus inadvertently isolating the power supply for equipment fed from busses located between the breakers. These electrical loads could include equipment necessary for the safe shutdown of the plant.

The draft breaker coordination evaluation indicated that breaker coordination may not exist for all devices of the following voltage levels: 460V-230V Load Centers; 230V Motor Control Centers; 120VAC Systems; 125VDC Systems; and 28VDC Systems. Therefore, a postulated fire damaging non-shutdown related cabling at these voltage levels could result in the loss of power to safe shutdown equipment. The draft breaker coordination evaluation indicates that breaker coordination exists at the 4160V voltage level with respect to the Diesel Generators. Subsequent analysis has shown that breaker coordination also exists between the 4160V voltage level and offsite power sources.

PSE&G is further evaluating the conclusions of this draft breaker coordination report. In the interim, compensatory measures have been taken to ensure that a fire does not occur that could damage associated non-safe shutdown cabling and possibly cause the loss of power to redundant safe shutdown equipment. This helps ensure the continued protection of the health and safety of the general public.

CORRECTIVE ACTION:

In response to the draft breaker coordination report, each plant area (both Units) was reviewed to establish the potential for fire induced circuit problems. Safe shutdown can be achieved utilizing two of the three plant's vital power divisions. If a fire area contains cabling associated with only one vital division of power, safe shutdown is not impacted by a postulated fire in that area. For those plant areas where a fire could potentially damage redundant vital cabling, fire watches have been established. If the area is protected by an installed fire detection system, an hourly roving fire watch has been established. If no detection is present, a continuous fire watch has been established. A fire watch is provided in related fire areas with the exception of 14 High Radiation/High Contamination Areas due to ALARA concerns. The following compensatory measures have been

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CORRECTIVE ACTION: (cont'd)

taken to ensure a fire will not develop in these areas which could impact safe shutdown equipment:

Volume Control Tank Room {CB} (both Units) - The fire watch will not enter the room, however, the area around the room is covered by an hourly fire watch. The room does not contain any vital cabling. Therefore, a fire in the room would need to propagate beyond the room before the potential exists to adversely impact safe shutdown capability. The room boundaries, although not rated fire boundaries, do provide a degree of separation between the redundant and separated power cabling. Similarly the Spent Resin Storage Tank Rooms, the Chemical Volume and Control System (CVCS) {CB} Holdup Tank Rooms 13 and 23 and the pipe alleys of both Units will not have a fire watch patrol. These rooms also do not contain vital cabling.

11, 12, 21, & 22 CVCS Holdup Tank Rooms (both Units) - Cameras have been installed to monitor these rooms. The fire watch will observe the camera monitor as part of the patrol for the area. A smoke detector has been installed in the Unit 2 CVCS Holdup Tank Rooms common exhaust ductwork. A smoke detector will be installed in the Unit 1 CVCS Holdup Tank Rooms common exhaust duct by October 20, 1987.

Letdown Heat Exchanger Room {CB} (both Units) - The fire watch will be limited to areas surrounding the room. The room is provided with fire detection and is closed with water tight doors for high-energy line break considerations. These doors do act as fire barriers to some degree, although, they are not "rated".

Containment (both Units) - The building temperature will be monitored on an hourly basis in lieu of a fire watch. The operators have been instructed to take specific actions if the temperature rises.

A safety evaluation has been issued (S-C-M200-NSE-0709). It addresses the concern for the continued safe operation of Salem Units No. 1 and No. 2 in light of the breaker coordination concern and the other Appendix R concerns addressed by Unit 2 LER 311/87-009-05. It concludes that continued operation of Salem Units No. 1 and No. 2 is justified based on the use of compensatory measures (e.g., fire watches).

The fire watch patrols throughout both Units provide reasonable assurance that the fire damage will be limited to only one train of redundant vital cabling/equipment. Therefore, the safe shutdown capability of the Units is maintained. Also, the fire watch patrols provide surveillance for hazardous conditions not normally detected by installed fire protection systems. Such conditions include: obvious activities by plant personnel that could increase the fire hazard in the area; conditions likely to cause a fire such as spills of flammable liquids or major malfunctioning of equipment; conditions

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CORRECTIVE ACTION: (cont'd)

likely to adversely affect fire protection such as blocked fire brigade access routes; and major accumulation of transient combustible materials.

The long term corrective action is to establish and verify the existence of breaker coordination at all voltage levels. Any hardware modifications and/or setpoint changes will be made after the conclusions of the draft breaker coordination study have been verified.



General Manager -
Salem Operations

MKG:pc

SORC Mtg. 87-085



PSEG

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

Salem Generating Station

October 16, 1987

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

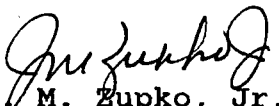
Dear Sir:

SALEM GENERATING STATION
LICENSE NO. DPR-70
DOCKET NO. 50-272
UNIT NO. 1
LICENSEE EVENT REPORT 87-011-00

1987 OCT 22 A 10:02
USNRC-DS

This Licensee Event Report is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(v)(D). This report is required within thirty (30) days of discovery.

Sincerely yours,


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

MJP:pc

Distribution

JE22
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The Energy People