

## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Salem Generating Station - Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 3 1 1 1										PAGE 13 1 OF 0 4	
TITLE (4) Reactor Trip From 69% - Main Generator "Loss of Field" Relay Actuation																					
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)							
0 5	0 2	8 5	8 5	0 0 8	0 0 0	0 5	3 1	8 5						0 5 0 0 0							
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																			
1		20.402(b) 20.406(a) X 80.73(a)(2)(iv) 73.71(b)																			
POWER LEVEL (10)		20.406(a)(1)(i) 80.38(a)(1) 80.73(a)(2)(v) 73.71(a)																			
0 1 6 1 9		20.406(a)(1)(ii) 80.38(a)(2) 80.73(a)(2)(vi) OTHER (Specify in Abstract below and in Text, NRC Form 308A)																			
		20.406(a)(1)(iii) 80.73(a)(2)(i) 80.73(a)(2)(viii)(A)																			
		20.406(a)(1)(iv) 80.73(a)(2)(ii) 80.73(a)(2)(viii)(B)																			
		20.406(a)(1)(v) 80.73(a)(2)(iii) 80.73(a)(2)(ix)																			
LICENSEE CONTACT FOR THIS LER (12)																					
NAME J. L. Rupp - LER Coordinator										TELEPHONE NUMBER AREA CODE 6 10 19 3 13 19 1-14 13 10 19											
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																					
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS												
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR							
YES (If yes, complete EXPECTED SUBMISSION DATE)										X NO											

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

On May 2, 1985, during routine power operation, a reactor trip was initiated by a turbine trip. The initiating event was the operation of the Main Generator "Loss of Field" relay. This, in turn, actuated the generator "Multi-trip" relay, resulting in a generator, turbine, and reactor trip. Investigation revealed that the "Loss of Field" relay (Relay #10 - Type CEH-11A) was installed incorrectly. The relay was wired according to the electrical schematic; however, the electrical schematic was not correct. The electrical schematic had been revised due to the recent generator changeout. The CEH-11A relay was not included in the revision; however, it was re-drawn because of the close proximity of the revised circuits. The relay was inadvertently re-drawn (and subsequently physically connected) to the wrong phase of the bus. The root cause was determined to be a procedural inadequacy, in that only those portions of the electrical schematic which had been revised were reviewed, and the review process did not include a review of those portions of the schematic which were re-drawn while implementing the revision. The relay wiring and drawings were subsequently corrected, and all generator protective circuits were design verified. Future drawing revisions will also include a review of those portions of the circuits which were re-drawn.

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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:**

Reactor Trip From 69% - Main Generator "Loss of Field" Relay Actuation - Turbine Trip and P-7

Event Date: 05/02/85

Report Date: 05/31/85

This report was initiated by Incident Report No. 85-107

**CONDITIONS PRIOR TO OCCURRENCE:**

Mode 1 - Rx Power 069 % - Unit Load 740 MWe

**DESCRIPTION OF OCCURRENCE:**

At 0916 hours, May 2, 1985, during routine power operation, a reactor trip occurred. The reactor trip was initiated by a turbine trip (first out annunciator was "Turbine trip and P-7"), which was actuated by the Main Generator protection circuitry [EL]. The Unit was stabilized in Mode 3 (Hot Standby), and at 0940 hours, in accordance with the requirements of the Code of Federal Regulations, 10CFR 50.72(b)(2)(ii), the Commission was notified of the automatic actuation of the Reactor Protection System [JC].

**APPARENT CAUSE OF OCCURRENCE:**

The initiating event was the operation of the generator "Loss of Field" relay. This, in turn, actuated the generator "Multi-trip" relay, resulting in a generator, turbine, and reactor trip. Investigation revealed that the "Loss of Field" relay (Relay #10 - Type CEH-11A) was installed incorrectly. The relay was wired according to the electrical schematic; however, the electrical schematic was not correct. The root cause was subsequently determined to be a procedural inadequacy, in that only those portions of the electrical schematic which had been revised were reviewed; i.e., the review process did not include a review of those portions of the schematic which were re-drawn while implementing the revision.

A revision of the Unit 2 Generator Relay Protection A.C. Schematic (P.S. Drawing No. 601035-B-9510) was required as a result of the recent Unit 2 Main Generator replacement.

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APPARENT CAUSE OF OCCURRENCE: (cont'd)

The schematic changes were required due to the addition of exciter stator differential protection, generator stator ground fault protection, generator over excitation protection, and the replacement of the negative sequence relay. These were the only A.C. schematic changes required, and the Loss of Field Type CEH-11A portion of the schematic was not to be changed. During the drafting process of the new schematic drawing, the current coil of the CEH-11A relay was "washed out", due to the close proximity of the revised circuits, and was therefore required to be re-drawn. However, it was inadvertently re-drawn on phase 2 instead of phase 3. Because the revision did not include any intentional changes to the CEH-11A portion of the schematic, this portion of the schematic was not checked during the review process of the revised drawing, and the mistake therefore remained undetected.

Subsequent to this occurrence involving the undetected error in the wiring schematic, the electrical contractor for the new generator, while reviewing the electrical diagram (P.S. Drawing No. 219403-A-8934) for the protection circuitry, observed a discrepancy between the wiring sequence table and the actual wiring shown on the diagram. A field questionnaire was generated to resolve this conflict which existed on the wiring diagram. The field questionnaire was answered using the erroneous schematic as a guide to determine the response. Believing the electrical schematic to be correct, the electrical diagram and the actual wiring on the CEH-11A relay were both changed to match the erroneous schematic drawing.

The CEH-11A relay is used to detect a loss of excitation on the generator. It is very important for the relay, which looks at impedance, to have the correct phase angle; therefore, the relay must be connected on the same phase for both voltage and current. Since the relay was connected on phase 2 current and on phase 3 voltage, the impedance seen by the relay was different than the impedance supposed to be seen in normal operation. This 120 degree phase angle difference resulted in actuation of the relay, when in fact, there was no actual loss of generator excitation.

ANALYSIS OF OCCURRENCE:

The primary function of the reactor trip (on turbine trip) is to prevent steam generator safety valve actuation, due to the steam generator pressure increase in the event that the turbine should trip during power operation. A turbine trip is initiated by the generator protection circuitry in order to limit equipment damage when a generator fault is indicated. In this instance, the fault indication (loss of generator field) was determined to be erroneous. The loss of field sensed by the relay was caused by the improperly wired relay, and was not due to actual generator conditions.

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**ANALYSIS OF OCCURRENCE: (cont'd)**

A turbine trip causes a direct reactor trip above approximately ten percent (10%) reactor power (P-7 interlock circuitry), and results in a controlled short term release of steam to the turbine condenser. This steam release removes sensible heat from the Reactor Coolant System [AB], thereby avoiding steam generator safety valve actuation. This reactor trip is anticipatory, and included as part of good engineering practice and prudent design. No credit is taken in any of the safety analyses for this trip. Reactor protection during power operation is provided by the Power Range Detectors, for rapid transients, and by the Overtemperature and Overpower Delta Temperature for slower developing transients. The Reactor Protection System functioned as designed. The turbine trip and the reactor trip occurred as required to prevent generator damage, and to minimize the primary plant transient. This occurrence involved no undue risk to the health or safety of the public. Because of the automatic actuation of the Reactor Protection System, the event is reportable in accordance with the Code of Federal Regulations, 10CFR 50.73(a)(2)(iv).

**CORRECTIVE ACTION:**

The relay was rewired correctly according to design, and the schematic and the wiring diagram were corrected. A design verification of the protective relaying involved in the Unit 2 Main Generator changeout was completed prior to the subsequent Unit synchronization, and no other problems were noted at that time. To preclude recurrence, future reviews of revised drawings will not be limited to only those portions which have been revised, but will also include a review of any portions which were re-drawn during implementation of the revision.

  
General Manager-  
Salem Operations

JLR:tns

SORC Mtg 85-090





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

Salem Generating Station

May 31, 1985

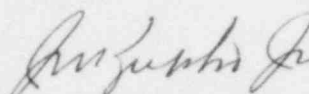
U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Dear Sir:

SALEM GENERATING STATION  
LICENSE NO. DPR-75  
DOCKET NO. 50-311  
UNIT NO. 2  
LICENSEE EVENT REPORT 85-008-00

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

Sincerely yours,

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

JLR:tcs

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