

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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)
4KV Vital Bus Second Level Undervoltage Protection Dropout Setpoint Concern (both Units).

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	7	2	2	9	3	0	1	4	0	1	0	8	2	7	9	3	Salem Unit 2	0 5 0 0 0 3 1 1
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																		

OPERATING MODE (9) 1	POWER LEVEL (10) 0 8 0	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(e)(1)	50.36(e)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)	

LICENSEE CONTACT FOR THIS LER (12)

NAME M. J. Pastva, Jr. - LER Coordinator	TELEPHONE NUMBER 6 0 9 3 3 9 - 5 1 6 5
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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 checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH 1 0	DAY 2 5	YEAR 9 3
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On 7/22/93, it was determined that the present 91.6% dropout setpoint for second level undervoltage (UV) protection of the 4 kilovolt (KV) vital buses (both Salem Units), may not fully protect motors should the bus voltage degrade to less than 93.2% but greater than 91.6%. This is contrary to Branch Technical Position (BTP)-PSB-1 and the Updated Final Safety Analysis Report (UFSAR). However, engineering calculation shows, given the postulated worst case design basis event, vital bus recovery voltage will not degrade to less than 93.2%. The 91.6% dropout setpoint was based on the lowest voltage the 4.16 KV motors could be allowed to operate (i.e. 90%) due to voltage drops in the motors' cables and relay inaccuracy considerations. The revised recovery voltage of 93.2% will now maintain all motors operable under degraded voltage conditions. During the next refueling outage on each Unit, design changes will be implemented to change the relay setpoint to meet the requirements of BTP-PSB-1. In the interim, administrative controls are being implemented. Technical Specifications and the UFSAR will be reviewed and revised as appropriate. Analysis of this event is continuing. Upon completion of this effort, a supplement to this LER will be submitted.

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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:

4 KV Vital Bus Second Level Undervoltage Protection Dropout Setpoint Concern (both Salem Units)

Event Discovery Date: 7/22/93

Supplement Report Date: 8/27/93

This report was initiated by Incident Report No. 93-320. This event is reportable per 10CFR50.73(a)(2)(ii)(B) and 10CFR50.73(a)(2)(v)(D).

CONDITIONS PRIOR TO OCCURRENCE:

Unit 1: Mode 1 Reactor Power 80% - Unit Load 815 MWe

Unit 2: Mode 1 Reactor Power 100% - Unit Load 1140 MWe

DESCRIPTION OF OCCURRENCE:

On July 22, 1993, it was determined that the present 91.6% dropout setpoint for second level undervoltage (UV) protection of the 4 kilovolt (KV) vital buses {VJ} (both Salem Units), will not fully protect motors at the 230 and 460 volt level should the 4KV bus voltage degrade to less than 93.2% but greater than 91.6%. This is contrary to Branch Technical Position (BTP)-PSB-1 and the Updated Final Safety Analysis Report (UFSAR). However, engineering calculation shows, given the postulated worst case design basis event, vital bus recovery voltage will not degrade to less than 93.2%.

The Nuclear Regulatory Commission was notified of this event per Code of Federal Regulations 10CFR50.72(b)(1)(ii)(B).

ANALYSIS OF OCCURRENCE:

Availability of minimum redundant alternating current (A.C.) power sources and distribution systems ensures sufficient power will be available to safety-related equipment for safe shutdown of the facility and the mitigation and control of accident conditions within the facility, as required by General Design Criteria 17 of Appendix "A" to 10CFR Part 50. Per BTP-PSB-1, the plant licensing basis requires a second level of undervoltage protection for 4KV vital buses to ensure minimum motor terminal voltage for all safety-related

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ANALYSIS OF OCCURRENCE: (cont'd)

motors. At Salem, when vital bus voltage drops below the dropout setpoint for relays providing this protection for greater than 13 seconds, vital bus loads are automatically transferred to their respective emergency diesel generators.

As part of the self-initiated Electrical Engineering Self-Assessment Program, electrical calculations are being reviewed to ensure guidelines of BTP-PSB-1 are met. On July 1, 1993, review of Revision 1 of ES-15.008(Q), "Salem Units 1 and 2 Degraded Grid Study" identified a potential concern with the 91.6% dropout setpoint of the Units' 4KV vital buses (1A, 1B, 1C, 2A, 2B, and 2C). On July 22, 1993, further analysis of this concern determined the recovery vital bus voltage is 93.2% of 4.16KV following transfer of the Auxiliary Power Transformers (APTs) to the Station Power Transformers (SPTs). This voltage could result should a group bus transfer to the SPTs occur coincident with a Loss-of-Coolant Accident (LOCA) and the unaffected unit in startup or shutdown.

UFSAR Section 8.3.1.2 describes the setpoint as being determined using the 90% minimum motor terminal voltage as the starting point. Since 93.2% bus voltage is required to ensure the minimum motor terminal voltage, the existing 91.6% dropout setpoint is not in compliance with the UFSAR or the BTP. However, because ES-15.008(Q) calculations also show that vital bus recovery voltage will not degrade to a level at which actual motor degradation could occur, the intent of the UFSAR and BTP is still met. These calculations take credit for operation, prior to the event, of the load tap changers which are set to maintain a minimum initial bus voltage of 4.3KV.

Following event discovery, an evaluation to justify continued operation of both Salem Units, concluded the present dropout setpoint of the relays does not meet the intent of the BTP. However, Revision 1 of Engineering Calculation ES-15.008(Q) determined there is not a significant safety concern with the present dropout setpoint provided the 4.16KV vital buses are maintained at 4.3KV or greater. Design changes will be implemented during the next refueling outage on each Unit to change the dropout setpoint to meet the intent of the BTP. For the interim, 4.16KV vital bus voltages are being monitored to assure load tap changers are operating properly to maintain a minimum bus voltage of 4.3KV. In addition, bus voltages below 4.3KV will be adjusted between 4.3KV and 4.5KV and restrictions concerning vital bus lineup will be in effect (see "CORRECTIVE ACTIONS:" section).

Analysis of this event is continuing. Included will be a historical assessment of the effect of the revised assumptions at vital bus levels below 4KV. Upon completion of this effort, a supplement to this LER will be submitted.

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APPARENT CAUSE OF OCCURRENCE:

The cause of this event is "Design, Manufacturing, Construction/Installation", per NUREG-1022. The 91.6% dropout setpoint was based on the lowest voltage the 4.16 KV motors could be allowed to operate (i.e. 90%) due to voltage drops in the motors' cables and relay inaccuracy considerations. The revised dropout setpoint, based upon the revised recovery voltage of 93.2%, will now maintain all motors operable under degraded voltage conditions.

PRIOR SIMILAR OCCURRENCES:

No prior similar occurrences of this event were identified.

SAFETY SIGNIFICANCE:

Engineering is currently completing its evaluation of the safety significance of past operation with the non-conservative second level UV setpoint. With the current interim controls, the health and safety of the public is not affected by this event. Upon completion of this evaluation this LER will be supplemented.

CORRECTIVE ACTION:

Design changes will be implemented to change the relay setpoint on both Units to meet the requirements of BTP-PSB-1 and be in accordance with the plant design basis. This will be done during the upcoming Unit 1 refueling outage and the next Unit 2 refueling outage.

A License Change Request will be implemented to revise Technical Specifications in accordance with the second level UV relay setpoint concern.

The UFSAR will be reviewed and revised as appropriate.

Administrative controls are being implemented to ensure the following restrictions are employed as interim action until implementation of design changes:

1. 4.16KV vital bus voltages will be logged hourly to assure a minimum vital bus voltage of 4.3KV. Bus voltages less than 4.3KV will be adjusted to between 4.3KV and 4.5KV.
2. Only two vital buses may be energized from their operating transformer if both the corresponding group buses are on their respective APT.
- 3a. Three vital buses may be energized from the operating transformer if one of the corresponding group buses is transferred to the operating SPT or

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CORRECTIVE ACTION: (cont'd)

- 3b. Three vital buses may be energized from the operating transformer if the load which can be transferred from the APTs is reduced by 5 mega volt amps.



General Manager -
Salem Operations

MJPJ:pc

SORC Mtg. 93-077