Report	Number:
Report	Date:
Occurrence Date:	
Facility:	

Salem Generating Station Public Service Electric & Gas Company Hancocks Bridge, New Jersey 08038

#### IDENTIFICATION OF OCCURRENCE:

Loss of 1B Vital Instrument Bus

### CONDITIONS PRIOR TO OCCURRENCE:

Operational Mode 1, Reactor Power 100%

78-73/01T 12/11/78 11/27/78

#### DESCRIPTION OF OCCURRENCE:

At 0455 on 11/27/78, loss of 1B Vital Instrument Bus initiated a reactor coolant loop low flow above P8 reactor trip. The action statement for Technical Specification 3.8.2.1 was implemented. No. 12 & No. 13 Auxiliary Feed Pumps did not start with low steam generator level. No. 12 was manually started by the control room operator. Recovery from the reactor trip was in progress when a high steam flow-low Taye inadvertent safety injection occurred at 0502. The loss of 1B Vital Instrument Bus resulted in inputs from each Steam Generator Hi Steam Flow logic to the Safety Injection logic. During recovery from the trip, Tave decreased to less than 543°F causing the proper coincident logic for Safety Injection. The safety injection was reset three minutes later. The Safeguards Equipment Control System (SEC) was activated by the safety injection signal, however, 1B diesel, No. 11 charging pump and No. 12 RHR pump failed to start. The action statements for Technical Specification 3.5.2 and 3.8.1.1.b were implemented. No. 11 RHR pump started from SEC and was secured after the safety injection. An attempt was made to restart No. 11 RHR pump at 0630 but the breaker would not close. Investigation of the bus failure showed that the inverter had failed and the bus was re-energized from the emergency supply solatron transformer. The surveillance requirement for Technical Specification 3.8.1.1.2.a.2 was completed satisfactory by 0756 and 1B diesel was declared operable at 1200 upon completion of the 1 hour run. Boration commenced at 0825 to bring the RCS to Xenon free cold shutdown condition. At 1315, the plant started cooldown and entered Hot Shutdown Mode 4 at 2100. RHR was initiated at 2240 and cooldown continued, however, all technical specification action statements were terminated prior to reaching cold shutdown. A detailed report of ECCS actuation will be submitted as a separate report as required by Technical Specification 6.9.2.a.

#### DESIGNATION OF APPARENT CAUSE OF OCCURRENCE:

The loss of 1B Vital Instrument Bus was traced to failure of the output transformer and two regulating resistors in the supply inverter. The loss of the bus de-energized the "12 RCP breaker open" input relays to the solid state protection system. This erroneous indication of a tripped RCP caused the low flow reactor trip logic to initiate the reactor trip. The failure of 1B diesel, No. 11 Charging Pump and No. 12 RHR Pump to start with initiation of safety injection is due to none of this equipment receiving an actuating signal from the 1B SEC cabinet which was de-energized by the 1B Vital Instrument Bus failure.

The cause of No. 13 Auxiliary Feed Pump failure to start was traced to misadjustment of the overspeed trip mechanism.

#### ANALYSIS OF OCCURRENCE:

Technical Specification 3.8.2.1 for onsite power distribution systems requires 115 volt vital instrument buses and inverters operable for 1A. 1B and 1C buses. The action statement requires that with less than the above complement of AC buses operable, restore the inoperable bus to operable status within 8 hours or be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours. The 1B Vital Instrument Bus was re-energized from the emergency supply solatron transformer and the inverter was returned to service within 21 hours. The RCS was borated to Xenon free cold shutdown condition and entered Hot Shutdown 17 hours after the reactor trip. Cooldown continued until all Technical Specification limiting conditions were terminated. The failure of No. 1B diesel, No. 11 Charging Pump and No. 12 RHR Pump to start at the time of safety injection is predictable under the circumstances and has been accounted for in the overall plant design of the safety systems. The failure of No. 13 Auxiliary Feed Pump to start appears to be a random failure. Operational testing has been done which shows the pump to be fully operational.

#### CORRECTIVE ACTION:

The failed output transformer and regulatory resistors in the 1B Instrument Bus inverter were replaced and tests were run to verify operability. The overspeed trip reset latch mechanism on No. 13 Auxiliary Feed Pump was re-adjusted to provide more positive latch operation. No. 11 RHR pump breaker was replaced and tested satisfactory. No further corrective action is necessary.

## LER 78-73/01T

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# FAILURE DATA:

Garrett Static Power Conditioning Static Inverter Model Series 1

-3-

Transformer/Regulating Model 5kVA

Mfg.: Airesearch Mfg. Co.

Prepared by A. W. Kapple SORC Meeting No. 75-78

Manager ém Generating Station

NHC FURM (7-77) LICENSEE EVENT REPORT - CONTROL BLOCK: | 1  $\Box$ (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION) 10 | 0 | 0 | 0 | - | 0 | 0 | 3 | 4 | Isl -10 SG (2)0 1 | 1 | 1 | 1 | (4)0 1 0 NJ LICENSE NUMBER CONT REPORT SOURCE 0 0 0 2 7 2 7 1 1 2 7 0 1 8 (3) 7 8 (9) L 6 0 5 7 81 DOCKET NUMBER EVENT DATE 39 EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10) 0 2 During normal operation, loss of 1B Vital Instrument Bus de-energized "RCP Breaker Open" relay in SSPS initiating a reactor trip. Seven minutes later, a safety 0 3 injection occurred and 1B Diesel, No. 11 Charging Pump & No. 12 RHR Pump failed to 0 4 The unit was cooled down to Hot Shutdown condition within 17 hours and 0 5 start. 0 6 remained in this condition throughout investigation and repair of the occurrence This is the third occurrence of this type. (78-57 & 78-51). 0 7 0 3 9 30 SYSTEM CAUSE SUBCODE CAUSE COMP. VALVE CODE COMPONENT CODE SUBCODE E | (12)A (13) Z (16) 0 9 B (11 G E N E R A (14) [ F | (15) т 10 18 SEQUENTIAL OCCURRENCE REVISION REPORT EVENT YEAR REPORT NO. CODE LEB'RO 7785 NC. (17) REPORT 7 0 11 8 0 7 3 T 0 NUMBER 27 28 29 31 32 COMPONENT MANUFACTURER ACTION FUTURE EFFECT ON PLANT SHUTDOWN METHOD ATTACHMENT SUBMITTED NPRD-4 PRIME COMP. ноцяз (22) FORM SUB. SUPPLIER 25 (18) Z (20) <u>C</u> (21 7 <u>y</u> (23) l q 10 0 ](24) (19 6 Y 9 <u>g (</u>25) T. 35 43 CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27) The cause of the bus failure was due to failure of the output transformer in the 1101  $\Pi$ | supply inverter. The transformer and regulating resistors were replaced. Failure of equipment to start on SEC initiation was due to loss of the bus and is con-1 2 sidered normal for this occurrence. No. 13 Aux Feed Pump overspeed trip reset 1 3 | latch was adjusted for more reliable latching 4 9 30 METHOD OF DISCOVERY FACILITY (30) DISCOVERY DESCRIPTION (32) % POWER OTHER STATUS E (28) 100 5 \_(31) N/Aа Reactor ACTIVITY CONTENT so 13 AMOUNT OF ACTIVITY (35) LCCATION OF RELEASE (36) RELEASED\_OF RELEASE N/A 6 N/A 11 20 PERSONNEL EXPOSUPES DESCRIPTION (39) NUMBER TYPE 0 37 z 38 0 N/Ā 7 0 PERSONNEL INJURIES 30 DESCRIPTION (41) NUMBER 3 0 0 (40) 1 0 N/A11 12 an. LOSS OF OR DAMAGE TO FACILITY (43) TYPE DESCRIPTION 42 g Z N/A 10 30 PUBLICITY NRC USE ONLY CESCRIPTION 45 เรรมสต 0 N/A 2 -59 10 -33 ЗO A. W. Kapple (609) 365-7000 Salen NAME OF PREPARER . PHONE: 628