



LER ATTACHMENT - RO #1-83-23

Facility: BSEP Unit 1

Event Date: April 26, 1983

Initial Site Conditions Prior to Event

Unit 1:

Unit 1 was in a refueling outage with the reactor vessel head removed, the reactor cavity flooded, and the fuel pool gates removed. The unit torus was drained and undergoing major modification work. The unit 230 kV bus 1A was under equipment clearance for periodic bus switchgear trip testing.

Unit 2:

Unit 2 was in reactor startup at 150 psi and 2 percent thermal power.

Chronological Description of Event

<u>Time</u>	<u>Happening and Consequence</u>
1431	A Unit 1 loss of off-site power occurred when 230 kV bus 1B was inadvertently tripped. As a result, all four plant emergency diesel generators automatically started with diesel generators 1 and 2, respectively, tying on plant emergency buses E-1 and E-2 which had deenergized when bus 1B tripped.
1435	A fire was discovered in the plant emergency bus 480V E-6 switchgear transformer and was extinguished.
1439	The E-6 bus was manually deenergized.
1448	Normal power supply to plant emergency buses E-1 and E-2 was reestablished and the process of securing the plant emergency diesel generators to normal standby readiness was performed.
1451	The plant was secured from a fire alarm condition which had affected the E-6 transformer.
1500	An unusual event was declared and required notifications were made because of the fire.
1510	Began cross-tying plant electrical loads normally supplied from E-6 with plant emergency bus E-5.
1520	Cross-tying of all E-6 loads with E-5 completed.

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Direct Effects of the Event

1. Unit 2 was rendered into a Limiting Condition for Operation (LCO) due to the loss of E-6 which made Unit 2 B RHR loop suppression pool cooling and B RHR loop LPCI inoperable for two hours and seven minutes until the E-6 loads were cross-tied with E-5. A subsequent shutdown of Unit 2 occurred as a direct result of the loss of E-6 (Technical Specification 3.8.2.1).
2. The Unit 1 refueling outage was impacted due to additional equipment repairs which resulted from the E-6 transformer fire.

Summary of the E-6 Transformer Failure Analysis

A failure analysis of the transformer, Brown Boveri Serial No. 21122-B01, was conducted by the plant Engineering Subunit, the Carolina Power & Light Company Harris Metallurgical Unit, and the transformer manufacturer representative.

Following the loss of off-site power to E-6, the plant emergency diesels automatically started, and the subsequent initial current flow to the transformer C phase initiated major arcing in the lower lug of the E-6 4160V primary lead at the tap collector bar.

It is felt the arcing began as a result of broken cable strands in the bore of the primary lug. The broken cable strands, which are aluminum, are attributed to either overtightening of the lug setscrews or mechanical stressing of the cable where it enters the lug. The arcing was most likely long term in nature where the lug had become weakened and degraded over an extended, undetermined period of time. The sudden initial current flow through the lug which occurred when E-6 was reenergized then caused the failure to initiate.

Due to the arcing, the lower portion of the lug melted. This then propagated to the transformer tap collector bar where approximately two-thirds of the bar was melted and/or vaporized. During this time period, the E-6 C phase coil became damaged, which then caused arcing from the remaining tap collector bar to the exposed coils and/or arcing between phase C coils. The 4160V primary feeder cable then broke away from the lug which then allowed the arc to propagate to a support lug common to the transformer B phase. At this time, it is felt the transformer feeder tripped due to overcurrent on the transformer C phase approximately six and one-half minutes after the loss of off-site power.

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Due to the extent of damage to the E-6 transformer C phase coil, it was replaced with a suitable transformer which was placed into service. In addition, a plant special procedure was developed and performed which inspected the electrical jumpers and pigtails on the plant emergency bus transformers to assure they were "equal to" or "better than" original condition.

The inadvertent trip of 230 kV bus 1B resulted from periodic trip testing of the 230 kV 1A bus power circuit breakers (PCBs). Unit 1 plant loads normally supplied from bus 1A were aligned to bus 1B, and bus 1A was removed from service and its PCBs were opened. Appropriate test switches for bus 1A were positioned, including the respective breaker failure lockout relay, 86BF, of each 1A bus PCB. The 86BF lockout relay of each PCB functions such that, when activated, it closes a contact in the respective PCB of the other bus and trips the PCB regardless of the position of test switches of the other bus. Due to personnel oversight of the switchyard test crew, the 86BF relays respective to the PCBs of 1B bus were not positioned for testing of the 1B bus. Consequently, when the 1A bus PCBs were tested, simultaneous tripping of the 1B bus PCBs occurred and loss of 1B bus resulted.

The tripping of 1B bus PCBs was not visually or audibly evident to personnel performing the trip testing. Trip/logic instrumentation for both buses is located on separate respective instrumentation panels in the switchyard relay house which are not in visual communication of one another. As a result, when simultaneous tripping of the 1B bus PCBs was occurring, the indication trip lights of the 1B bus PCB trip/logic instrumentation were not apparent to the trip test personnel. In addition, the simultaneous pickup of the 1B bus PCB trip/logic instrumentation could not be audibly distinguished from the 1A bus PCB trip/logic instrumentation.

Following the event, involved switchyard crew personnel were appropriately counseled concerning their actions regarding the event. As a result of this event, formal procedures satisfactory to the CP&L System Operations Department, and concurred with by the Brunswick Nuclear Project, will be appropriately prepared prior to work in the switchyard. It is felt this will assist in the prevention of future similar occurrences.

# CP&L

Carolina Power & Light Company

Brunswick Steam Electric Plant  
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July 18, 1984

FILE: B09-13510C  
SERIAL: BSEP/84-1442

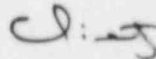
Mr. James P. O'Reilly, Administrator  
U. S. Nuclear Regulatory Commission  
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101 Marietta Street N.W.  
Atlanta, GA 30323

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1  
DOCKET NO. 50-325  
LICENSE NO. DPR-71  
SUPPLEMENT TO LICENSEE EVENT REPORT 1-83-23

Dear Mr. O'Reilly:

In accordance with Section 6.9.1.9b of the Technical Specification for Brunswick Steam Electric Plant, Unit 1, the enclosed supplemental Licensee Event Report is submitted. The original report fulfilled the requirement for a written report within thirty (30) days of a reportable occurrence and both are in accordance with the format set forth in NUREG-0161, July 1977.

Very truly yours,



C. R. Dietz, General Manager  
Brunswick Steam Electric Plant

MJP/jlh/LETJH1

Enclosure

cc: Mr. R. C. DeYoung  
NRC Document Control Desk

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