Progress Energy

OCT 1 3 2004

SERIAL: BSEP 04-0140 10 CFR 50.73

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Brunswick Steam Electric Plant, Unit No. 1
Docket No. 50-325/License No. DPR-71
Licensee Event Report 1-2004-002

Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.73, Carolina Power & Light Company, now doing business as Progress Energy Carolinas, Inc., submits the enclosed Licensee Event Report. This report fulfills the requirement for a written report within sixty (60) days of a reportable occurrence.

Please refer any questions regarding this submittal to Mr. Edward T. O'Neil, Manager – Support Services, at (910) 457-3512.

Sincerely,

David H. Hinds
Plant General Manager
Brunswick Steam Electric Plant

SFT/sft

Enclosure: Licensee Event Report

IE22

Progress Energy Carolinas, Inc.
Brunswick Nuclear Plant
P.O. Box 10429
Southport, NC 28461

cc (with enclosure):

U. S. Nuclear Regulatory Commission, Region II
ATTN: Dr. William D. Travers, Regional Administrator
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, GA 30303-8931

U. S. Nuclear Regulatory Commission
ATTN: Mr. Eugene M. DiPaolo, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

U. S. Nuclear Regulatory Commission
ATTN: Ms. Brenda L. Mozafari (Mail Stop OWFN 8G9) **(Electronic Copy Only)**
11555 Rockville Pike
Rockville, MD 20852-2738

Ms. Jo A. Sanford
Chair - North Carolina Utilities Commission
P.O. Box 29510
Raleigh, NC 27626-051

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet e-mail to Infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	1 of 8

4. TITLE
Manual Reactor Shutdown During Loss of Offsite Power Event

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									BSEP, Unit 2	05000324
08	14	2004	2004	-- 002 --	00	10	13	2004	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	1
10. POWER LEVEL	67

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	X 50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	X 50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Steven F. Tabor, Lead Engineering Technical Support Specialist	(910) 457-2178

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
E	FK	BKR	ITE	Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MO	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On August 14, 2004, while experiencing severe weather due to Hurricane Charley, a fault occurred on the Weatherspoon 230 kV transmission line (i.e., one of four lines connecting Unit 1 to the grid). Subsequent failure of a power circuit breaker (PCB) associated with the 230 kV 1B bus resulted in a 230 kV 1B bus lockout, and ultimately, a loss of power to the reactor recirculation pumps. By procedure, the loss of these pumps necessitated a manual reactor protection system actuation. As designed, the four emergency diesel generators auto-started and the required emergency buses re-energized. All primary containment isolation actuations occurred as designed. The high pressure injection and reactor core isolation cooling systems were manually started to maintain reactor water level and pressure within acceptable limits. Following restoration of the required systems and completion of the event reviews necessary to support startup, reactor startup was commenced on August 17, 2004. The cause of the event is attributed to a combination of conditions involving the failure of PCB 24B and the switchyard breaker scheme in affect at the time of the event. Corrective actions include replacement of degraded PCB components, leak checks of site PCBs, revision to the PCB maintenance process to adequately address moisture intrusion, and revisions to operating procedures controlling the switchyard breaker scheme.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	2004	-- 002 --	00	2 OF 8

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

INTRODUCTION

On August 14, 2004, during Hurricane Charley, Unit 1 experienced a loss of 230 kV 1B bus [FK/BU], which was feeding the unit's startup auxiliary transformer (SAT) [FK/XFMR]. As a result, power was lost to both reactor coolant recirculation (RCR) pumps [AD/P] 1A and 1B. Upon loss of the RCR pumps, in accordance with plant procedures, operators initiated a manual reactor shutdown followed by a manual turbine trip, loss of main generator, and subsequent loss of the unit's auxiliary transformer (i.e., loss of offsite power (LOOP)).

Notifications associated with this event were made to the NRC in accordance with 10 CFR 50.72(a)(1)(i); 50.72(b)(3)(xiii); 50.72(b)(2)(iv)(B); and 50.72(B)(2)(xi), Reference Event Numbers 40951, 40955, 40954, 40953, and 40958. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), as an event that resulted in manual actuation of the Reactor Protection System (RPS) and 10 CFR 50.73(a)(2)(v), as an event that could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident (i.e., Unit 1 LOOP).

INITIAL CONDITIONS

On August 13, 2004, severe weather associated with remnants of Tropical Storm Bonnie was affecting areas of southeastern North Carolina. Unit 1 was operating at rated thermal power (RTP). At approximately, 0405 hours, severe weather conditions caused the failure of several H-frame structures supporting the Jacksonville 230 kV transmission line (i.e., one of four lines connecting Unit 1 to the grid). In accordance with procedures, with only three of four transmission lines available to the unit, the system dispatcher contacted the Unit 1 control room and communicated instructions to lower Unit 1 power to approximately 67% of RTP. The requested downpower was completed by 0430 hours. Unit 2 was not affected by the Jacksonville line failure and continued to operate at RTP.

The Weatherspoon transmission line was connected to the plant's 230 kV switchyard through power circuit breakers (PCB) 24 A and B [FK/BKR], with PCB 24B selected as the preferred breaker in the event of breaker reclosure. Electrical power to the Unit 1 RCR pumps was being supplied from the SAT, which was aligned to receive power from the 230 kV 1B bus. Other major plant loads were being supplied power from the unit auxiliary transformer (UAT), which was receiving power from the main generator. At approximately 1820 hours, a hurricane warning associated with Hurricane Charley was in effect for the BSEP and surrounding area.

On August 14, 2004, with high winds reported in the area surrounding the BSEP site, at approximately 1258 hours, an insulator supporting the B phase of the 230 kV Weatherspoon transmission line mechanically failed, allowing the line to come into contact with the lines support structure, causing a non-clearing phase-to-ground fault.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	2004	-- 002 --	00	3 OF 8

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

EVENT DESCRIPTION (Reference attached drawing for supporting information)

Upon sensing the faulted condition created by the insulator failure, PCBs 24A and 24B opened. PCB 24B, being the preferred breaker, reclosed and tripped after 15 seconds and again after 50 seconds since the fault was still present. PCB 24A did not attempt to reclose since it requires PCB 24B to remain closed for a period of time before it will attempt to close. Even though PCB 24B cycled open as designed, instrumentation indicates that fault current was still present through the breaker contacts after the third trip. At this point the 230 kV 1B bus B phase differential relay operated resulting in a primary lockout of the 1B bus.

With the SAT aligned to the 230 kV bus 1B, the SAT de-energized, resulting in a loss of power to the 4kV balance of plant 1B bus which provides power to the RCR pumps. As designed, upon the loss of the SAT, the four emergency diesel generators (EDGs) started.

In accordance with abnormal operating procedure, 1AOP-04.0, "Low Core Flow," operators inserted a manual reactor shutdown and turbine trip. All control rods inserted. Immediately following the manual reactor shutdown, as expected, reactor pressure vessel (RPV) water level decreased below the low level one setpoint resulting in the actuation of Primary Containment Isolation System (PCIS) isolation group 2, Drywell Floor Drain Isolation Valves, group 6, Containment Atmosphere Isolation Valves, and group 8, Residual Heat Removal Shutdown Cooling Isolation Valves, isolation signals.

The turbine trip resulted in a loss of main generator and subsequent loss of the UAT. PCIS group 1, Main Steam Line Isolation Valves (MSIVs), group 3, Reactor Water Cleanup Isolation Valves, and group 10, Non-interruptible Air to Drywell Isolation Valves, actuations and Reactor Building Ventilation system isolation occurred due to the loss of power. EDGs 1 and 2 connected to emergency buses E1 and E2, respectively, to supply electrical power. The Standby Gas Treatment (SBGT) system train 1A started while the 1B SBGT failed to start.

Control room operators manually started the High Pressure Coolant Injection (HPCI) system first in the injection mode and later to control reactor pressure. Operators also used the Reactor Core Isolation Cooling (RCIC) system in the injection mode to aid in RPV level control. Safety Relief Valves were used as necessary to aid in RPV pressure control.

At 1308 hours, RPV level was restored. By 1353 hours, the PCIS groups 2, 3, and 8 isolations were reset. By 1545 hours, the SAT was aligned to the 230 kV 1A bus, restoring offsite power. At 1601 hours, the 1B, 1C, and 1D 4kV buses were energized from the SAT to support remaining recovery activities. Reactor building ventilation was restored by 1818 hours. By 2011 hours, EDGs 1 and 2 were secured and placed in automatic. The 230 kV bus 1B was re-energized at approximately 2018 hours. The PCIS group 1 isolation signal was reset by 2320 hours, the MSIVs were reopened, and the normal plant heat sink (i.e. condenser) was restored.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	2004	-- 002 --	00	4 OF 8

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

EVENT DESCRIPTION (continued)

On August 15, 2004, at 0000 hours the PCIS group 6 isolation was reset. At 0112 hours, suppression pool temperature decreased below 95° Fahrenheit and the primary containment control procedure was exited.

By 0650 hours, both HPCI and RCIC had been placed in standby. SBGT system train A was placed in the standby condition by 2159 hours.

Following an assessment of startup readiness, Unit 1 reactor startup was commenced and reactor criticality was achieved at 1146 hours on August 17, 2004.

RELATED EQUIPMENT ISSUES

Following the event, the site incident investigation team determined that the RPV bottom head cooldown limit had been exceeded. The maximum cooldown rate observed was 206 degrees Fahrenheit (F)/hour which exceeds the allowable cooldown rate of 100 degrees F/hour. Due to thermal stratification, bottom head cooldown rates exceeding 100 degrees F/hour are expected during scenarios where the RCR pumps trip and external sources of coolant (i.e., HPCI and RCIC) are injected into the RPV. In accordance with requirements of the Technical Specifications, engineering analysis concluded RPV integrity was not adversely affected by the transient.

During the event three motor loads (i.e., the 1A control rod drive pump, 1B conventional service water pump, and the 2C conventional service water pump) powered from emergency bus E1 were unexpectedly observed to be operating. Based on the circumstances associated with this event, these loads should have been shed from the emergency bus prior to EDG #1 output breaker closure. Following the event, further analysis of this condition determined that the EDG #1 output breaker closed on emergency bus E1 without the appropriate 4 kV breakers opening as required by the load shed circuit. The failure to properly load shed rendered EDG #1 inoperable and constitutes a reportable condition in accordance with 10 CFR 50.73 requirements. This condition is being reported in LER 1-2004-003.

With the loss of the SAT, the automatic initiation logic for the SBGT system actuated; however, only the 1A SBGT train started. The 1B train failed to start. The 1A SBGT train reached rated flow within seconds. Since either train will provide 100% of the required flow needed to satisfy accident conditions, a loss of SBGT safety function did not occur. A comprehensive fault tree analysis was performed to determine the cause of the 1B SBGT failure; however, a distinct root cause for this occurrence was not determined. The most likely cause of the 1B SBGT train to function is attributed to a small piece of foreign material located within the AR1-B relay, (i.e., an auto-start logic relay), which was identified during internal inspection of the sealed relay. It is suspected that the foreign material may have prevented relay contact closure and thus, prevented the necessary auto-start logic from actuating when the loss of power to the logic occurred. The suspect relay was replaced and the 1B SBGT train was tested satisfactorily prior to restoring the system to service on August 17, 2004.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	2004	-- 002 --	00	5 OF 8

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

RELATED EQUIPMENT ISSUES (continued)

The failure of the insulator supporting the B phase of the 230 kV Weatherspoon transmission line initiated the sequence of events that led to this event. The metal casting on the insulator broke due to extreme corrosion. With the combination of the forces applied by severe wind conditions during the storm and the degraded insulator condition, the insulator was not capable of supporting the load of the line. The failed insulator has been replaced and the line completely restored to service. Visual inspections of transmission line support structures including the cross arm, poles, conductor, braces, and insulators are performed annually. It is difficult based on current visual inspection technique to observe the area of the insulator affected by the corrosion. Based on the lessons learned from this event, the insulator strings for transmission lines in the corridor, (i.e., eight line region exiting the site switchyard up to the point in which the lines cross and become two 4 line corridors), to the site will be replaced with an insulator design which is less susceptible to corrosion. Those insulator strings for transmission lines outside the corridor will be inspected and replaced as needed with the improved insulator design. In addition, the procedure for visual inspection of the insulators will be revised to incorporate more specific inspection guidance related to corrosion of the metal casting components and replacement of degraded insulators with the improved insulator design.

EVENT CAUSE

The cause of the event is attributed to a combination of conditions involving the failure of PCB 24B and the switchyard breaker scheme in affect at the time of the event. If either of these conditions had not been present, the event would not have occurred.

Breaker testing and vendor component failure analysis concluded that PCB 24B failed due to an internal bushing failure, which resulted in current flashover within the breaker. The bushing failure is attributed to moisture intrusion. The fault condition in combination with moisture produced an arc which was sensed by the bus differential relay and ultimately resulted in a primary lockout of the 1B bus. The root cause of this event is attributed to an inadequate PCB maintenance process. Specifically, preventive and corrective maintenance being applied to the breakers has not identified the adverse trend of moisture build up in the bushings as a problem that requires corrective action.

PCB 24B breaker was the preferred breaker in the recloser scheme. The scheme is designed such that on an initial fault signal, both breakers (i.e., PCB 24A and B) open, then after a predetermined time delay, the preferred breaker will close. The non-preferred breaker will not attempt to close. If the fault conditions still exist, the preferred breaker will open again. After a predetermined time, the preferred breaker will close. If the fault conditions still exist, the preferred breaker will open and remain open (i.e., lockout).

EVENT CAUSE (continued)

The non-preferred breaker will not attempt to close unless the preferred breaker successfully closes and remains closed for a predetermined time. Historically, the preferred scheme has been configured with two of the breakers aligned to the 1A bus and two breakers aligned to the 1B bus. This breaker scheme was originally established based on the assumption that a breaker failure bus trip would not strip both 230kV buses on the unit and cause a load reject from the turbine. However, based on the circumstances of this event, had the preferred breaker scheme been arranged such that the SAT was connected to the non-preferred bus and the PCB 24B failed in the same manner, the event would have been limited to a bus strip without a loss of the SAT.

CORRECTIVE ACTIONS

- PCB 24B degraded bushing has been replaced and the breaker restored to service.
- Leak checks of site PCBs will be performed and a plan developed to correct identified deficiencies based on leak detection results by December 15, 2004.
- Preventive and corrective maintenance processes will be revised as needed to establish adequate measures for identifying and trending moisture intrusion into PCBs and ensure needed corrective actions to resolve identified moisture intrusion related deficiencies are identified within the corrective action program for timely resolution.
- The breaker scheme on both units has been aligned such that the SAT is connected to the non-preferred bus.
- Applicable plant procedures will be revised to reflect the preferred breaker scheme for SAT alignment.

SAFETY ASSESSMENT

The safety significance of this occurrence is considered minimal. Although the subsequent failure of PCB 24B to clear the sensed fault caused a challenge to safety systems, the breaker failure relay logic scheme functioned as designed and isolated the 230 kV 1B bus. In addition, the EDGs started and aligned to the emergency buses as designed and thus provided electrical power for other mitigating systems. Although a load shedding issue was identified during this event (i.e.,Reference LER 1-2004-003), engineering analysis demonstrated that the affected EDG was capable of satisfying its safety related function throughout the event. The RPS, PCIS, and other mitigating systems performed as designed, which allowed a controlled shutdown of the unit, without additional incident.

PREVIOUS SIMILAR EVENTS

A review of events occurring within the past three years has not identified any previous similar occurrences.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	2004	-- 002 --	00	7 of 8

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

COMMITMENTS

Those actions committed to by Progress Energy Carolinas, Inc. (PEC) in this document are identified below. Any other actions discussed in this submittal represent intended or planned actions by PEC. They are described for the NRC's information and are not regulatory commitments. Please notify the Manager – Support Services at BSEP of any questions regarding this document or any associated regulatory commitments.

No regulatory commitments are contained in this report. Those actions discussed in this submittal will be implemented in accordance with corrective action program requirements.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	2004	-- 002 --	00	8 of 8

NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

Unit 1 Switchyard Arrangement