



DEC 23 2002

SERIAL: BSEP 02-0183

10 CFR 50.73

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

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 2  
DOCKET NO. 50-324/LICENSE NO. DPR-62  
LICENSEE EVENT REPORT 2-02-001

Gentlemen:

In accordance with the Code of Federal Regulations, Title 10, Part 50.73, Carolina Power & Light Company 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,

W. G. Noll  
Plant General Manager  
Brunswick Steam Electric Plant

CRE/cre

Enclosure: Licensee Event Report

IE22

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cc (with enclosure):

U. S. Nuclear Regulatory Commission, Region II  
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Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@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 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)

<b>1. FACILITY NAME</b> Brunswick Steam Electric Plant (BSEP), Unit 2	<b>2. DOCKET NUMBER</b> 05000324	<b>3. PAGE</b> 1 OF 5
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**4. TITLE**  
Instrumentation Malfunction Results in Loss of Safety Function for the High Pressure Coolant Injection System

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
11	01	2002	2002	-- 001 --	00	12	23	2002	FACILITY NAME	DOCKET NUMBER
										05000
										05000

<b>9. OPERATING MODE</b> 1	<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:</b> (Check one or more)									
<b>10. POWER LEVEL</b> 100	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)		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	
<b>NAME</b> Charles R. Elberfeld, Sr. Engineering Technical Support Specialist	<b>TELEPHONE NUMBER (Include Area Code)</b> (910) 457-2136

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
B	BJ	PDS	Rosemount In	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 November 1, 2002, at approximately 1641 hours, a Unit 2 High Pressure Coolant Injection (HPCI) Steam Line Flow – High analog trip unit (Rosemount Model 510DU7A010) malfunction resulted in a HPCI Steam Supply Outboard Isolation valve closure and HPCI system inoperability. The plant responded as designed to the event. Plant operators entered the appropriate Technical Specification Limiting Conditions for Operation and the trip unit was replaced. By November 2, 2002, at 0542 hours, the HPCI system was returned to service and declared operable. The safety significance of this occurrence is considered minimal.

The cause of the HPCI system isolation and inoperability is attributed to the spurious actuation of the analog trip unit due to the malfunction of the output transistor.

Further testing and evaluation is in progress to better understand the failure mode and establish appropriate action thresholds. The special process procedure for monitoring analog trip unit output voltages will be revised to incorporate the updated thresholds. The scope of analog trip unit and/or output transistor replacement activities will then be determined and corrective actions initiated as appropriate.

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FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Brunswick Steam Electric Plant (BSEP), Unit 2	05000324	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 5
		2002	-- 001	-- 00	

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 November 1, 2002, at approximately 1641 hours, a Unit 2 High Pressure Coolant Injection (HPCI) [BJ] Steam Line Flow – High analog trip unit (2-E41-PDTS-N004-2) [PDS] (Rosemount Model 510DU7A010) malfunction resulted in a HPCI Steam Supply Outboard Isolation valve [ISV] closure and HPCI system inoperability. The plant responded as designed to the event. At the time of the event, Unit 2 was in Mode 1, operating at 100 percent of rated thermal power (RTP). At 2212 hours, the NRC was notified (Event Number 39339) in accordance with 10 CFR 50.72(b)(3)(v)(D) for an event or condition that at the time of discovery could have prevented the fulfillment of the safety function of a system that is needed to mitigate the consequences of an accident.

This event is being reported in accordance with 10 CFR 50.73(a)(2)(v)(D) as an event or condition that could have prevented the fulfillment of the safety function of a system that is needed to mitigate the consequences of an accident.

EVENT DESCRIPTION

On November 1, 2002, Unit 2 was operating at 100 percent of RTP with all Emergency Core Cooling (ECCS) and the Reactor Core Isolation Cooling (RCIC) systems operable. At approximately 1641 hours, the control room received a HPCI STEAM LINE BREAK DP HIGH annunciator accompanied by the closure of the HPCI Steam Supply Outboard Isolation valve (2-E41-F003) and a closure signal to the already-closed HPCI Torus Suction valve (2-E41-F041). Operators verified that reactor building and HPCI area temperatures remained within normal limits. An auxiliary operator verified that there was no steam leak in the HPCI room that would be indicative of a steam line break or high flow condition. Control room operators entered Technical Specifications (TS) Limiting Condition for Operation (LCO) 3.5.1 for the HPCI system as well as LCO 3.3.6.1 for the isolation instrumentation and performed the required actions including immediately verifying RCIC system operability. At 1649 hours, the HPCI STEAM LINE BREAK DP HIGH annunciator cleared.

At 2212 hours, the NRC was notified of the HPCI system loss of safety function due to the spurious actuation of valve 2-E41-F003. On November 2, 2002, at approximately 0025 hours, instrumentation and controls (I&C) technicians were authorized to troubleshoot and resolve the instrumentation problem. By 0310 hours, the I&C technicians determined that the analog trip unit, 2-E41-PDTS-N004-2 caused the isolation and replaced the trip unit with a Rosemount Model 710DU analog trip unit. By 0542 hours, maintenance surveillance test “HPCI Steam Line Break High D/P Trip Unit Chan Cal,” (2MST-HPCI21Q) was successfully performed to demonstrate the operability of the affected instrumentation and the HPCI system was placed in the “Stand-by” mode in accordance with plant procedures. TS LCO 3.5.1 for the HPCI system as well as LCO 3.3.6.1 for the isolation instrumentation were exited upon the restoration of the HPCI system to “Stand-by.”

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

EVENT CAUSE

The cause of the HPCI system isolation and inoperability is attributed to the spurious actuation of the 2-E41-PDTS-N004-2 trip unit due to the malfunction of the output transistor. After trip unit replacement, bench testing was performed. The output of the trip unit is supposed to be 24 volts DC (VDC) for a tripped condition and 0 VDC for an un-tripped condition. With the trip unit in an un-tripped condition, after a slow increase to less than one VDC, a brief output spike, sufficient to cause a trip, occurred. After the spike, output voltage reset to a low value and then started back on a slow increase. The new failure pattern was repeatable with this trip unit as well as with an additional trip unit that was being bench tested (i.e., see Previous Similar Events section).

Rosemount Inc. issued a 10 CFR 21 notification on June 8, 1990, describing a manufacturing problem with the output transistors used in some Model 510DU analog trip units. Rosemount concluded that transistors manufactured before December 31, 1980, were manufactured with inadequate atmospheric controls. The problem transistors had high moisture content that resulted in a current leakage path across the transistor. The condition could cause the output of the trip card to provide a trip signal when no trip is indicated from the sensed parameter. The reported failure mode was characterized by a gradual increase in trip output voltage until the relay or other alarm monitor circuitry was activated. The problem is not applicable to Rosemount Model 710DU analog trip units.

As a result of the Rosemount 10 CFR 21 notification and Model 510DU analog trip unit problems at BSEP, a monitoring program was established to check the output voltages of the trip units on a periodic basis. The program called for trip unit replacement if the output voltage was found to be above 1.0 VDC. This 1.0 VDC action threshold was considered to be conservative since it was well below the drop-out and pick-up voltages for the associated relays.

The output voltage monitoring and replacement program is currently implemented by special process procedure (OSPP-ETU001), "Rosemount Analog Trip Unit Output Voltage Checks." Evaluation of recent trip unit failures (see Previous Similar Events section) has determined that the monitoring program is not adequate to prevent spurious actuations of the trip units.

CORRECTIVE ACTIONS

1. The failed 2-E41-PDTS-N004-2 trip unit has been replaced with a Rosemount Model 710 DU trip unit.
2. Given that transistor malfunction has occurred only with trend data above 0.6 VDC, an interim threshold of 0.1 VDC has been established. As a result, two Unit 1 and two Unit 2 trip units are scheduled for replacement.
3. Testing and evaluation will continue until the failure mode is better understood or until a bounding limit of acceptable voltage is established. The scope of trip units monitored for output transistor concerns will also be re-evaluated.

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

CORRECTIVE ACTIONS (continued)

4. By February 22, 2003, OSPP-ETU001 will be revised to include the results of the evaluations described in Corrective Action 3.
5. By March 4, 2003, the scope of analog trip unit and/or output transistor replacement activities will be determined and corrective actions initiated as appropriate.

SAFETY ASSESSMENT

The safety significance of this occurrence is considered minimal. The HPCI system is designed to provide core cooling for a wide range of reactor pressures and is part of the ECCS. The ECCS is designed, in conjunction with primary and secondary containment, to limit the release of radioactive materials to the environment following a loss of coolant accident. The ECCS consists of the HPCI system, the Core Spray system, the low pressure coolant injection mode of the Residual Heat Removal system, and the Automatic Depressurization system. All ECCS subsystems are designed to ensure that no single active component failure will prevent automatic initiation and successful operation of the minimum required ECCS equipment. The RCIC system provides a similar function to the HPCI system but is not considered to be part of the ECCS. As a result of this occurrence, the HPCI system was declared inoperable for approximately 13 hours and two minutes. During the time the HPCI system was inoperable, the plant remained in a steady state and all ECCS as well as the RCIC system remained operable. This condition is bounded by the plant's Technical Specifications and the Updated Final Safety Analysis Report.

PREVIOUS SIMILAR EVENTS

A review of reportable events for the past three years has not identified any previous similar events. On August 19, 2002, the failure of the Unit 1 Rosemount Model 510DU analog master trip unit 1-E41-PDTM-N005-1 to reset during a calibration surveillance test resulted in a non-reportable occurrence. The trip unit was replaced with a Rosemount Model 710DU master trip unit. On November 1, 2002, at 1726 hours, approximately 45 minutes after the spurious actuation of 2-E41-PDTS-N004-1, another Rosemount Model 510DU analog trip unit (2-B21-PTS-N023B-2) generated a spurious trip for approximately 40 minutes, resulting in a REACTOR VESSEL HIGH PRESSURE annunciator (i.e., another non-reportable occurrence). The trip unit was replaced with a Rosemount Model 710DU trip unit.

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

COMMITMENTS

Those actions committed to by Carolina Power & Light (CP&L) Company in this document are identified below. Any other actions discussed in this submittal represent intended or planned actions by CP&L. 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.

- By February 22, 2003, OSPP-ETU001 will be revised to include the results of the ongoing testing and evaluations to determine appropriate output voltage thresholds and scope of monitoring.
- By March 4, 2003, the scope of analog trip unit and/or output transistor replacement activities will be determined and corrective actions initiated as appropriate.