



Progress Energy

October 3, 2006

SERIAL: BSEP 06-0108

10 CFR 50.73

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

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Docket Nos. 50-325 and 50-324/License Nos. DPR-71 and DPR-62
Licensee Event Report 1-2006-005

Ladies and 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.

Please refer any questions regarding this submittal to Mr. Randy C. Ivey,
Manager – Support Services, at (910) 457-2447.

Sincerely,

A handwritten signature in black ink, appearing to read 'B. C. Waldrep'.

B. C. Waldrep
Plant General Manager
Brunswick Steam Electric Plant

MAT/mat

Enclosure:

Licensee Event Report

cc (with enclosure):

U. S. Nuclear Regulatory Commission, Region II
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Ms. Jo A. Sanford
Chair - North Carolina Utilities Commission
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1. FACILITY NAME
Brunswick Steam Electric Plant (BSEP), Unit 1

2. DOCKET NUMBER
05000325

3. PAGE
1 of 5

4. TITLE
Control Room Emergency Ventilation (CREV) System Inoperable due to Chlorine Detectors

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	06	2006	2006	-- 005 --	00	10	03	2006	Brunswick Unit 2	05000324
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more)												
1	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	100	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME: Mark A. Turkal, Lead Engineer - Licensing

TELEPHONE NUMBER (Include Area Code): (910) 457-3066

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

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

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

At 1232 hours on August 6, 2006, the Control Room Emergency Ventilation (CREV) system unexpectedly realigned to the chlorine protection mode. Subsequent investigations determined that unexpected actuation of the chlorine detectors and realignment of the CREV system was due to sensitivity of the chlorine detectors to Nitrogen Dioxide (NO₂), a constituent of diesel exhaust fumes. These detectors were installed by a modification, implemented on February 3, 2006, to replace obsolete detectors in the chlorine detection system. This failure mode has the potential to render the CREV system inoperable as a result of Emergency Diesel Generator operation in response to a Loss of Offsite Power/Loss of Coolant Accident event and 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 structures or systems that are needed to mitigate the consequences of an accident. Additionally, the event is also being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as operation prohibited by the plants' Technical Specifications.

No documentation existed indicating that the impact of EDG exhaust gases had been evaluated or considered in the original design of the CREV system. As a result of this undocumented and/or unconsidered design input, the modification to replace the obsolete chlorine detectors with detectors of a different design did not account for the potential impact of NO₂. Operability of the radiation and smoke protection modes of the CREV system was restored and the system placed in its normal standby alignment at 1255 hours on August 6, 2006. The system has been operated in this configuration since that time.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
Brunswick Steam Electric Plant (BSEP), Unit 1	05000325	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 5
		2006	-- 005	-- 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

At 1232 hours on August 6, 2006, the Control Room Emergency Ventilation (CREV) system [VI] unexpectedly realigned to the chlorine protection mode. Control room annunciation indicated that the actuation was due to high chlorine in the control room air intake. Upon further investigation it was confirmed that, although no chlorine was present, chlorine detectors 1-X-AT-2997, 2-X-AT-2997, and 2-X-AT-2997-1 were tripped. The chlorine isolation signal was removed by disabling the chlorine detectors. Operability of the radiation and smoke protection modes of the CREV system was restored and the system placed in its normal standby alignment at 1255 hours on August 6, 2006.

Subsequent investigations determined that unexpected actuation of the chlorine detectors and realignment of the CREV system was due to sensitivity of the chlorine detectors to Nitrogen Dioxide (NO₂), a constituent of diesel exhaust fumes. These detectors were installed by a modification, implemented on February 3, 2006, to replace obsolete detectors in the chlorine detection system.

This failure mode has the potential to render the CREV system inoperable as a result of Emergency Diesel Generator (EDG) [EK] operation in response to a Loss of Offsite Power/Loss of Coolant Accident (LOOP/LOCA) event. Therefore, 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 structures or systems that are needed to mitigate the consequences of an accident. Additionally, the condition existed since implementation of the modification on February 3, 2006. Therefore, the event is also being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as operation prohibited by the plants' Technical Specifications.

Event Description

Initial Conditions

At the time the condition was identified, Unit 1 and Unit 2 were both in Mode 1, at approximately 100 percent of rated thermal power.

Discussion

The CREV system is required to provide protection to the operators for three types of events: a radiation event, up to and including a Design Basis Accident; a toxic gas event (i.e., complete rupture of the chlorine tank car, or a slow leak lasting for an extended period of time); and an external smoke event.

To provide radiation protection, the CREV system automatically switches to the radiation/smoke protection mode of operation to prevent infiltration of contaminated air into the control room. A system of dampers isolates the control room, and a part of the recirculated air is routed through either of the two filter

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Event Description (continued)

subsystems. Outside air is taken in at the normal ventilation intake and is mixed with the recirculated air before being passed through one of the CREV subsystems for removal of airborne radioactive particles.

In the event of a chlorine release, the CREV system enters a full recirculation mode (i.e., chlorine protection mode), with no outdoor air intake. The emergency filtration trains do not start, since they do not effectively remove chlorine and may be damaged by the presence of chlorine. Protection for chlorine gas "overrides" any concurrent, ongoing, or subsequent radiation or smoke initiation signals. The override design offers protection to operations personnel in the control room against potentially fatal chlorine gas releases. This protection is required any time the chlorine tank car is within the exclusion area. Operation of the CREV system in the chlorine protection mode renders the system inoperable in the radiation and smoke protection modes.

On August 1, 2006, a spurious actuation of two chlorine detectors caused the CREV system to realign to the chlorine protection mode. As a result, the chlorine protection mode of the CREV system was declared inoperable, Technical Requirements Manual (TRM) 3.19, "CREV System - Chlorine Protection Mode," was entered, and the chlorine tank car was removed from the exclusion area. The chlorine detectors remained in service to facilitate troubleshooting activities.

Subsequently, on August 6, 2006, at 1139 hours, EDG 2 was started for a routine monthly load run. At 1232 hours, the CREV system unexpectedly realigned to the chlorine protection mode. Control room annunciation indicated that the actuation was due to high chlorine in the control room air intake. Upon further investigation, it was confirmed that, although no chlorine was present, chlorine detectors 1-X-AT-2997, 2-X-AT-2997, and 2-X-AT-2997-1 were tripped. The chlorine isolation signal was removed by removing power to the tripped detectors. Operability of the radiation and smoke protection modes of the CREV system was restored and the system placed in its normal standby alignment at 1255 hours on August 6, 2006.

Engineering has evaluated the cause of the August 6, 2006, actuation and determined that the chlorine detectors tripped due to the presence of diesel exhaust. On February 3, 2006, a modification was implemented to replace obsolete detectors in the chlorine detection system with new detectors of a different design. A review of vendor documentation for the new chlorine detectors identified a number of gases, besides chlorine, to which the sensors are sensitive. Specifically, the detectors have the same sensitivity to Nitrogen Dioxide (NO₂), a constituent of diesel exhaust fumes, as to chlorine. Operating EDG 2 at fully loaded conditions resulted in sufficient concentration NO₂ in the control room air intake to trip the detectors.

Inoperability of the radiation protection mode of the CREV system requires entry into Technical Specification (TS) 3.7.3, "Control Room Emergency Ventilation System," Condition B. In addition, inoperability of the smoke protection mode of the CREV system requires entry into Condition B of

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Event Description (continued)

TRM 3.18, "CREV System - Smoke Protection Mode." The chlorine protection mode of the CREV system was not affected by the design deficiency.

Event Cause

No documentation existed, in any design record or calculation, indicating that the impact of EDG exhaust gases had been evaluated or considered in the original design of the CREV system. As a result of this undocumented and/or unconsidered design input, the 2006 modification did not consider the potential for gases, other than chlorine, tripping the new detectors.

Safety Assessment

The safety significance of this condition is considered minimal.

The CREV system provides radiation, smoke, and chlorine protection for the operators. The system is a standby system that is common to both Units 1 and 2. The safety function of the CREV system is the radiation protection portion of the radiation/smoke protection mode and includes two redundant high efficiency air filtration subsystems for emergency treatment of recirculated air and outside supply air. In Modes 1, 2, and 3, the CREV system must be operable to control operator exposure during and following a Design Basis Accident. The postulated scenario of a LOOP coincident with a LOCA has a very low probability of occurrence. From a Probabilistic Risk Analysis perspective, these are two independent events, with each individually having a low probability of occurrence. There is a much lower probability of occurrence of a LOOP coupled simultaneously with a LOCA, and has the probability of occurring once per 1.0 E-07 years.

The plant staff took immediate and proper actions to return the CREV system to operable. The chlorine tank car was previously removed from site on August 1, 2006, in support of trouble shooting activities on the chlorine detection system. As a result of the August 6, 2006, event, the chlorine detectors were disabled and the radiation and smoke protection modes of the CREV system were restored to operable status at 1255 hours on August 6, 2006. The CREV system was considered inoperable from the time the modification was implemented on February 3, 2006, until August 6, 2006, at 1255 hours.

For the time period that the CREV system was determined to be inoperable, performance of plant personnel and equipment in the control room was not adversely affected. There was no nuclear or industrial safety consequence from this event.

Corrective Actions

- The chlorine protection mode of the CREV system has been declared inoperable and the chlorine tank car removed from the exclusion area, thereby allowing the radiation/smoke protection mode of

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Corrective Actions (continued)

the CREV system to be restored to operable status. The chlorine tank car will not be brought within the exclusion area unless the chlorine protection mode of CREV is restored to operable status.

- Specification 252-100, "Chlorine Gas Monitors," will be revised to ensure that design of the chlorine detection subsystem includes consideration of the potential for inadvertent actuation of the detectors due to cross-contamination. This revision is scheduled to be completed by December 13, 2006.

Previous Similar Events

A review of LERs and corrective action program condition reports for the past three years identified the following similar events.

- LER 1-2006-003, dated June 7, 2006, documents a condition where the CREV system was declared inoperable due to a design deficiency introduced as a result of the February 3, 2006, modification to replace obsolete detectors in the chlorine detection system. The root cause of the event reported in LER 1-2006-003 was ineffective design review of the chlorine detector modification prior to approval. The corrective actions associated with LER 1-2006-003 could not have reasonably been expected to prevent the condition reported in this LER.
- LER 1-2006-001, dated March 9, 2006, documents a condition where the CREV system was declared inoperable when the 2B Control Building instrument air compressor failed and the CREV system shutdown due to loss of control air. The root cause of this event was determined to be ineffective condition monitoring of compressor oil pressure to detect degradation of the compressor. The corrective actions associated with LER 1-2006-001 could not have reasonably been expected to prevent the condition reported in this LER.
- LER 1-2005-004, dated July 11, 2005, documents a condition where the CREV and Control Room AC systems were declared inoperable when electrical power was lost to bus E1, making the 2B Compressor inoperable. The 2A Compressor should have automatically started, but did not start due to a wire lug that had broken and interrupted the control power circuit. The corrective actions associated with LER 1-2005-004 could not have reasonably been expected to prevent the condition reported in this LER.

Commitments

No regulatory commitments are contained in this report.