UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
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ATLANTA, GEORGIA 30303-8931

February 15, 2008

Carolina Power and Light Company
ATTN: Mr. Benjamin C. Waldrep
Vice President
Brunswick Steam Electric Plant
P. O. Box 10429
Southport, NC 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC SUPPLEMENTAL INSPECTION REPORT NO. 05000325/2008007

Dear Mr. Waldrep:

On February 1, 2008, the US Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Brunswick Plant facility. The enclosed report documents the inspection findings, which were discussed on February 1, 2008, with you and other members of your staff.

As required by the NRC Reactor Oversight Process Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure 95001. The purpose of the inspection was to examine the causes for and actions taken related to the performance indicator for the Mitigating Systems Performance Index (MSPI) for the Cooling Water Systems for Unit 1 crossing the threshold from Green (very low risk significance) to White (low to moderate risk significance) in the third quarter of 2007. This supplemental inspection was conducted to provide assurance that the root causes and contributing causes of the events resulting in the White performance indicator are understood, to independently assess the extent of condition, and to provide assurance that the corrective actions for risk significant performance issues are sufficient to address the root causes and contributing causes and to prevent recurrence. The inspection consisted of selected examination of representative records and interviews with personnel.

Based on the results of this inspection, no findings of significance were identified. The inspector determined that, in general, the problem identification, root cause and corrective actions were adequate.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). Adams is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Randall A. Musser, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket No.: 50-325
License Nos.: DPR-71

Enclosure: Inspection Report 05000325/2008007
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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Letter to Benjamin C. Waldrep from Randall A. Musser dated February 15, 2008

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC SUPPLEMENTAL INSPECTION REPORT NO. 05000325/2008007

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Southport, NC 28461

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	50-325
License No.:	DPR-71
Report No:	05000325/2008007
Licensee:	Carolina Power and Light (CP&L)
Facility:	Brunswick Steam Electric Plant, Unit 1
Location:	8470 River Road SE Southport, NC 28461
Dates:	January 28, 2006 - February 1, 2008
Inspector:	P. O'Bryan, Senior Resident Inspector, Shearon Harris
Approved by:	R. Musser, Chief Reactor Projects Branch 4 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000325/2008-007; 1/28/2008 - 2/1/2008; Brunswick Steam Electric Plant; Supplemental Inspection IP 95001 for a White performance indicator in the Mitigating Systems Cornerstone.

This inspection was conducted by a senior resident inspector. No violations of regulatory requirements were identified. The significance of most findings is identified by their color (Green, White, Yellow, Red) using IMC 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process", Revision 4, dated December, 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection in accordance with Inspection Procedure 95001, to assess the licensee's evaluation associated with a Unit 1 performance indicator in the mitigating systems cornerstone. The mitigating systems performance indicator (MSPI) for Cooling Water Systems crossed the threshold from Green (very low risk significance) to White (low to moderate risk significance) in the third quarter of 2007. Specifically, the licensee's Unit 1 Cooling Water Systems MSPI value reached 2.95E-6. The MSPI becomes White when the value reaches 1.0E-6. The MSPI consists of an unreliability index based on cooling water system function failures and an unavailability index based on cooling water system unavailability. Since the vast majority of the contribution to the White MSPI is from the unavailability index, the inspection focused on the cooling water system unavailability.

  The inspector determined that the licensee performed a comprehensive evaluation of the conditions that led to the MSPI exceeding the Green/White threshold. Performance deficiencies were identified by the NRC during previous inspections and are listed in subsequent sections of this report. In addition, the licensee adequately analyzed the circumstances associated with those issues and, where appropriate, took effective immediate corrective action. Also, the licensee developed corrective actions to prevent recurrence.

B. Licensee-Identified Violations

None.

REPORT DETAILS

01 INSPECTION SCOPE

The purpose of this supplemental inspection was to assess the licensee's evaluation associated with the MSPI for Cooling Water Systems that crossed the threshold from Green to White in the third quarter of 2007. Specifically, the licensee experienced events in 2006 and 2007 that led to excessive unavailability of portions of the cooling water systems. The cumulative effect of these events was to cause the Unit 1 MSPI for cooling water systems to cross the threshold from Green to White in the third quarter of calendar year 2007. The inspectors reviewed the licensee's actions associated with these three events and conducted interviews with licensee personnel to ensure that the root and contributing causes of the events were identified, understood, and appropriate corrective actions were initiated. The three events reviewed were as follows:

1. July, 2006 - Failure of the 2C conventional service water (CSW) pump due to a failed shaft coupling led to unavailability of the five Unit 1 service water pumps. The Unit 1 service water pumps accumulated unavailability while they were inspected for similar problems as the 2C CSW pump experienced and while they were rebuilt. This event was included in NRC Inspection Report 05000325, 324/2007007 as an NRC identified violation of 10 CFR 50, Appendix B, Criterion XVI for failure to establish proper preventative maintenance to prevent failure after the pumps were previously identified as being susceptible to corrosion (NCV 05000324/2007007-01).

2. July, 2007 - Failure of the suction valve to 1B and 1D residual heat removal service water (RHRSW) booster pumps (valve 1-SW-V105) due to loss of the pins that connect the valve disc to the valve stem. The loss of the pins prevented the valve from opening and caused the 1B and 1D RHRSW booster pumps to trip soon after they were started on July 26, 2007. Unplanned unavailability was accumulated while the system was searched for the pins. However, one pin was not found and the pin eventually caused a failure of the 1D RHRSW booster pump on August 21, 2007. This event also led to additional planned unavailability while similar valves were modified to prevent a similar failure of the valves. This event was included in NRC Special Inspection Report 05000325/2007011 as an NRC violation (NCV 05000325/2007011-02) of 10 CFR 50, Appendix B, Criterion V for inadequate loose parts analysis and retrieval, and an inadequate operability determination.

3. August, 2007 - Degrading differential pressure across the 1B residual heat removal (RHR) room cooler led to unplanned unavailability of the 1B nuclear service water (NSW) pump during inspection of the system. Foreign material was found in the system that was attributed to damaged seating material from valve 1-SW-V19, which was discovered damaged and repaired in 2004. This event was associated with an NRC identified violation of 10 CFR 50, Appendix B, Criterion XVI for failure to correct past problems with the seating material in this type of valve (NRC Special Inspection Report 05000325/2007011, NCV 05000325/2007011-01).

Throughout the report enclosure, these events will be referred to by their numerical designators listed above.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determination of who identified the issue and under what conditions.

Events 1 and 2 were self-revealing. Event 3 was identified by the licensee. The non-cited violations listed in section 01 were NRC identified.

b. Determination of how long the issue existed, and prior opportunities for identification.

Event 1 occurred during normal operation of the 2C CSW pump on July 26, 2006. As outlined in NRC inspection report 05000325, 324/2007007, there were opportunities to identify corrosion related degradation of pump components prior to this failure. As a result, NCV 05000324/2007007-01 was identified for failure to establish preventative maintenance to preclude the failure.

Event 2 occurred during normal operation of the valve. The valve failure was caused by an inadequate installation of the pins by the vendor. The valve was installed in the system in 2000, therefore the condition existed since 2000 but the valve operated satisfactorily until 2007. Periodic visual inspections of the valve were performed, but the inspections did not detect a problem with the pins.

Event 3 was caused by foreign material (valve seating material) degrading the performance of 1B RHR room cooler. This degradation was revealed by lowering flow through the cooler, which was identified by the licensee. The foreign material originated from valve 1-SW-V19, which was discovered damaged in a refueling outage in 2004. However, all of the material was not retrieved from the system when the 1-SW-V19 was discovered damaged. As outlined in NRC inspection report 05000325/2007011, failure to maintain the system free of foreign material led to NCV 05000325/2007011-01.

c. Determination of the plant-specific risk consequences (as applicable) and compliance concerns associated with the issues.

Event 1 resulted in significant planned unavailability of the five Unit 1 service water pumps. Event 2 resulted in significant planned and unplanned unavailability of the 1B RHRSW loop and a functional failure of the 1D RHRSW booster pump. Event 3 resulted in significant unplanned unavailability of the 1B NSW pump. The three NRC violations discussed in section 01 of this report were determined to have very low risk significance (Green).

02.02 Root Cause and Extent-of-Condition Evaluation

a. Evaluation of methods used to identify root causes and contributing causes.

To evaluate this issue, the licensee used a combination of structured root cause analysis techniques including equipment performance analysis, causal factor analysis, support/refute methodology, and fault tree analysis. The methods and combinations of methods used to identify root and contributing causes were appropriate.

b. Level of detail of the root cause evaluation.

For the three events, the root cause evaluations were of sufficient detail to support the identified root and contributing causes.

For event 1, the licensee determined the root cause of the failure of the 2C CSW pump was excessive corrosion of the type 316 stainless steel #4 coupling. This excessive corrosion occurred because all of the susceptible pump components were not being inspected at an adequate frequency.

For event 2, the licensee determined the root cause of the valve 1-SW-V105 failure was an incorrect installation of the pins which hold the valve disc to the valve stem by the vendor.

For event 3, the licensee determined the root cause of the failed valve seat was creep rupture caused by compressive stress on the outside ring area of the valve seat liner that is in contact with line gaskets installed to prevent system leakage. This creep rupture allowed the non-bonded seating material to enter the system as foreign material.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience.

The root cause evaluations for the three events did consider prior occurrences of similar problems where applicable.

d. Consideration of potential common causes and extent of condition of the problem.

The inspector's review of the three events verified that the licensee's evaluation considered the potential for common cause and extent of condition. The three events did not have common causal factors, and the extent of condition of the three issues has been adequately addressed by the licensee.

e. Consideration of safety culture components as described in inspection manual chapter (IMC) 0305.

The licensee's evaluation considered safety culture components as described in IMC 0305. In addition to the cross-cutting components identified in previous NRC findings, the licensee identified safety culture components for events 2 and 3. The safety culture components identified for failure number 2 were in the areas of human performance

(decision making and work practices) and problem identification and resolution (use of operating experience). The licensee identified that event 3 had safety culture components in the areas of human performance (work practices) and in problem identification and resolution (evaluation of problems). The inspector noted that all three events were related to the safety culture component of human performance (decision making). The inspector also noted that the licensee is currently implementing corrective actions to improve organization decision making (NCR 250330), and initiated an additional investigation for this inspector observation (NCR 264559).

02.03 Corrective Actions

a. Appropriateness of corrective actions.

The licensee took corrective actions to repair the equipment failures related to the cooling water events discussed in section 01. The licensee also specified corrective actions to address root and contributing causes for the six failures.

For event 1, the licensee inspected and rebuilt each of the service water pumps. A time-based preventative maintenance task to visually inspect susceptible portions of the service water pumps was also implemented. This preventative maintenance task has a periodicity of ten years. Although these inspections add to pump planned unavailability, they are appropriate to address pump long term reliability.

For event 2, the licensee repaired the failed valve and changed the procurement specification to require that the pins securing the valve disc to the valve stem be staked. Also, other valves with the same vulnerability have had the pins staked or have been visually inspected to ensure the pins are in place. Susceptible valves with pins that have not been staked have been scheduled for repair during the next refueling outage.

For event 3, valves with non-bonded seats have been replaced with valves that either have bonded seats or do not have rubber seating material. Also, the inspection procedure for the valves has been changed to include inspection of the condition of the rubber seating material to ensure it is not degrading.

b. Prioritization of corrective actions.

The inspector determined that the corrective actions for the three events were adequately prioritized.

c. Establishment of a schedule for implementing and completing the corrective actions

The inspector verified that the licensee's corrective action program identified assigned individuals, completion dates, and reference numbers to ensure that individual corrective actions would be completed in accordance with their priority.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence.

The inspector determined that effectiveness reviews had been completed or were scheduled for the causes of the three events.

04 MANAGEMENT MEETINGS

Exit Meeting Summary

The inspector presented the results of the supplemental inspection to Mr. Benjamin C. Waldrep and other members of licensee management and staff on February 1, 2008. The inspector confirmed that any proprietary information provided or examined during the inspection would be returned.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

L. Grzeck, Senior Engineer
E. Harkom, Service Water System Engineer
S. Howard, Manager - Operations
R. Ivey, Manager - Site Support Services
F. Jefferson, Supervisor, Technical Services
A. Pope, Supervisor - Licensing/Regulatory Programs
C. Raines, Chlorination System Engineer
S. Rogers, Manager - Maintenance
T. Sherril, Senior Engineer
B. Waldrep, Site Vice President
E. Wills, Plant General Manager

NRC Personnel

J. Austin, NRC Senior Resident Inspector
G. Kolcum, NRC Resident Inspector

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

None.

Discussed

None.

LIST OF DOCUMENTS REVIEWED

Procedures

ADM-NGGC-0104, Work Management Process
1PM-MEC506, Inspection Criteria for Service Water Valves
OP-43, Service Water System Operating Procedure
OPT-24.1.2, SW Miscellaneous Valve Operability Test

Action Requests (AR)

AR 241166	Declining Trend in Service MSPI
AR 201240	2C CSW Pump Coupling Failure
AR 240978	1B/1D RHRSW Booster Pump Tripped on Start
AR 243867	1D RHRSW Booster Pump Failed to Start
AR 244448	Foreign Object Search and Retrieval Effort Associated with SW-105 Pin Inadequate
AR 241630	U1 Vital Header Flow Through the 1B RHR Room Cooler Degrading
AR 243465	U1 Vital Header Flow Through the 1B RHR Room Cooler Degrading Due to Foreign Material
AR 249130	1A RHR Room Cooler Differential Pressure Degrading
AR 224737	Oyster Shell Growth in CSW Headers
AR 261462	Oyster Shells Found in the 2B RBCCW Heat Exchanger

Miscellaneous

NRC Inspection Report 05000325, 324/2007011
NRC Inspection Report 05000325, 324/2007007