UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

January 7, 2005

EA-04-076

Carolina Power & Light Company
ATTN: Mr. C. J. Gannon
Vice President
Brunswick Steam Electric Plant
P. O. Box 10429
Southport, NC 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC SUPPLEMENTAL INSPECTION REPORT 05000324/2004009

Dear Mr. Gannon:

On December 10, 2004, the US Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Brunswick Steam Electric Plant Unit 2 for a White finding associated with an emergency diesel generator jacket water cooling system leak. The enclosed inspection report documents the inspection findings, which were discussed with members of your staff on December 10, 2004.

The purpose of this inspection was to examine your problem identification, root cause and extent-of-condition evaluation, and corrective actions associated with this White finding, in the Mitigating Systems cornerstone. The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, inspected selected plant components, and interviewed personnel.

Based on the results of this inspection, the NRC determined that the problem identification, root cause and corrective actions for the White finding were adequate. No findings of significance were identified during this inspection.

In accordance with 10CFR 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 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 by G. MacDonald for/

Paul E. Fredrickson, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket No. 50-324
License No. DPR-62

Enclosure: NRC Inspection Report 05000324/2004009
w/Attachment: Supplemental Information

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cc w/encl:
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No:	50-324
License No:	DPR-62
Report No:	05000324/2004009
Licensee:	Carolina Power & Light Company
Facility:	Brunswick Steam Electric Plant, Unit 2
Location:	8470 River Road SE Southport, NC 28461
Dates:	December 6 - 10, 2004
Inspector:	R. Hagar, Senior Resident Inspector - Robinson
Approved by:	Paul E. Fredrickson, Chief Reactor Projects Branch 4 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000324/2004009; 12/06/2004 - 12/10/2004; Brunswick Steam Electric Plant, Unit 2; supplemental inspection IP 95001 for a White finding in the mitigating systems cornerstone.

This inspection was conducted by a senior resident inspector. No findings of significance were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

This supplemental inspection was conducted to assess the licensee's evaluation associated with a White finding in the mitigating systems cornerstone. That White finding involved a leak in the jacket water cooling system of emergency diesel generator (EDG) no. 3 which rendered that EDG inoperable.

During this supplemental inspection, which was performed in accordance with Inspection Procedure 95001, the inspector determined that all performance issues identified by the NRC were also identified by the licensee, either as conditions adverse to quality, or as causes of those conditions. In addition, the licensee adequately analyzed the circumstances associated with those issues and, where appropriate, took effective immediate corrective action. Also, the licensee developed adequate corrective actions to prevent recurrence, and scheduled timely completion of those actions. Given the licensee's acceptable performance in addressing the inoperable EDG, the White finding associated with this issue will only be considered in assessing plant performance for a total of four quarters in accordance with the guidance in NRC Inspection Manual Chapter 0305, "Operating Reactor Assessment Program."

B. Licensee-Identified Violations

None

REPORT DETAILS

01 INSPECTION SCOPE

The purpose of this supplemental inspection was to assess the licensee's evaluations associated with a White finding in the mitigating systems cornerstone of the reactor safety strategic performance area. That finding and the associated circumstances are described in NRC inspection report 05000325,05000324/2004002. The following four performance issues were identified in that report, and were the focus of this inspection:

- In the licensee's operability assessments on December 7, 2003, and January 5, 2004, the licensee failed to consider the effects of a loss-of-offsite-power event on the ability of the demineralized water system to make up to the emergency diesel generator (EDG)-3 jacket water cooling (JWC) system.

- Timely and appropriate corrective action, commensurate with the potential safety significance, was not taken for leakage identified from EDG-3 JWC system on December 7, 2003.

- On December 8, the licensee addressed the JWC leak using the minor maintenance process, but did not stop the leak and did not perform an adequate functional verification test at that time.

- Sometime prior to January 1, 2001, the licensee failed to reinstall two supports on the JWC piping associated with EDG-3, after removing those supports. Those missing supports allowed the misalignment which caused the leak.

The text below addresses each of these issues separately. In the following sections, these issues are referred to as "Operability Assessments", "Timely Corrective Action", "Functional Verification", and "Missing Supports", respectively.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

.01 Operability Assessments

This issue was independently identified by both the licensee and the site resident inspectors. With respect to identifying this issue, the licensee's evaluation, as documented in AR 114573, stated only that *"The initial operability determination maintained the EDG operable with this leak. After further review of the size and consequences of the leak, the EDG was declared inoperable."* The inspector found that the initial January 5, 2004, operability determination was made on the nightshift, and that, after the dayshift began, this issue was apparently identified by both the licensee and the site resident inspectors as follows:

- When the Operations Manager reviewed the information turned over by the nightshift crew, he recognized that the demineralized water system could not make up to the JWC system during a loss-of-offsite-power event, and directed the dayshift crew to declare the EDG inoperable, thereby acknowledging this issue. According to the operator logs, this occurred prior to 7:10 am.

- During their daily plant-status reviews, the site resident inspectors noted that the nightshift had made a determination of EDG operability, and subsequently questioned the basis for the determination. That questioning also identified this issue.

The licensee's evaluation of this issue focused on the operability determinations made on December 7 and January 5.

.02 Timely Corrective Action

This issue was identified by the site resident inspectors, during their review of the circumstances associated with the EDG operability determinations described above. The licensee addressed this issue in AR 114576 as a root cause of the leak.

.03 Functional Verification

The licensee identified this issue as a contributing cause of the leak. This issue was documented in AR 114576. Without describing any supporting analysis, the evaluation stated that:

- Maintenance personnel repaired the leaking fitting on December 8, 2003, without performing a functional verification.

- Maintenance personnel did not identify repeated jacket water leaks over a 3-year period as maintenance rework items.

The licensee's evaluation did not document how long this issue existed. However, by stating that Maintenance personnel did not identify repeated jacket water leaks over a 3-year period as maintenance rework items, the licensee's evaluation implied that this issue had existed at least that long.

.04 Missing Supports

This issue was identified by the licensee through the evaluation of the leak. In AR 114576, the evaluation identified this issue as a root cause of the leak.

The evaluation described a review of EDG-3 operating history since maintenance was last performed that affected the JWC system. That review concluded that no leakage had been observed prior to December 7, 2003.

The risk associated with this issue was addressed in the licensee's evaluation of the risk associated with the inoperability of EDG-3 from December 8, 2003, until January 7, 2004. (This period includes a 2-day delay required to repair the leak.) That evaluation included EDG-3 fault exposure hours, external events, and human reliability analysis for the actions required for operators to restore JWC expansion-tank level, during the time period when the demineralized water system was available for makeup. The licensee's evaluation determined that the finding was of low-to-moderate safety significance (White). This result agreed with the NRC's risk characterization of the finding. The licensee's evaluation was presented at an open regulatory conference in NRC Region II offices on May 19, 2004. The details of the risk evaluation are contained in NRC Inspection Reports 05000325,05000324/2004002, and 05000324/2004008.

02.02 Root Cause and Extent-of-Condition Evaluation

.01 Operability Assessments

The licensee did not use a systematic method to identify root and contributing causes for this issue, because they classified it as priority 2. (In the licensee's corrective-action program, root-cause evaluations are required only for those conditions classified as priority 1.) Consequently, the licensee completed only an apparent-cause evaluation. That evaluation identified the following two apparent causes:

- Inadequate analysis conducted by the system engineer.
- Shift Superintendent failed to use conservative decision-making.

This evaluation included the prior occurrence of an inadequate operability assessment on December 7, 2003. The inspector determined that the evaluation conducted to a level of detail commensurate with the significance of the problem.

.02 Timely Corrective Action

In AR 114576, this issue is identified as a root cause of the leak, and is characterized as *"Maintenance and Engineering organizations accepted degraded conditions and performance of the jacket water system."*

The evaluation did not identify the methods used to identify this issue as a root cause. However, in discussions with the inspector, licensee personnel described how they used Equipment Performance Analysis, Events & Causal Factors charting, and various human-performance-analysis techniques to identify the causes.

.03 Functional Verification

The licensee identified this issue as a contributing cause of the leak. Although the evaluation did not describe how this issue was analyzed, the evaluation identified Work Practices, Verbal Communication, and Procedure or Document Weakness as its causes.

The licensee's discussion of this issue included consideration of "past practices" and "the normal process", but did not include consideration of prior occurrences of the problem and knowledge of prior operating experience. The evaluation also did not explicitly address extent-of-condition for this issue. However, the evaluation did describe a review of work orders generated on the EDG and EDG fuel-oil systems from January 1, 2001, through the present. It also described a related discussion with maintenance personnel.

.04 Missing Supports

This issue was identified by the licensee through visual inspection of the piping associated with the leak. However, with respect to this issue, the evaluation in AR 114576 stated *"It is not known when the supports were removed from this piping..."*, and did not describe any activities associated with determining when the supports may have been removed. In response to the inspector's questions, the licensee revealed that they had conducted an extensive search of computerized work records in several databases, but were unable to find any activity that removed the supports. The inspector determined that the licensee's search of computerized work records, as described during the inspection, was conducted to a level of detail commensurate with the significance of the problem.

The evaluation described an extent-of-condition evaluation that involved inspecting similar supports on the other three EDGs. Those inspections identified one missing support on one other EDG.

02.03 Corrective Actions

.01 Operability Assessments

For the apparent cause of "Inadequate analysis conducted by the system engineer", the evaluation in AR 114573 identified the corrective action of revising the Duty Engineer expectations to require contacting the Engineering Manager on operability determinations, in order to give management opportunities for additional oversight.

For the apparent cause of "Shift Superintendent failed to use conservative decision-making", the corrective actions were to discuss the event one-on-one with the involved Shift Superintendent, and to discuss the event with all Shift Superintendents and Control-Room Supervisors in a staff meeting. These corrective actions were prioritized such that they were completed in a timely manner.

In their apparent-cause evaluation, the licensee planned no corrective actions to prevent recurrence, because in their corrective-action program, corrective actions to prevent recurrence are required only for those conditions classified as priority 1. However, in AR 146085 the licensee expedited preparation and approval of a new procedure which they identified as 0OI-01.19, Operability Determinations. That procedure became effective on December 29, 2004. The procedure assigned responsibilities and provided detailed guidance for initiating, documenting, tracking, and completing formal operability condition reviews. It also described initiating appropriate action within the corrective-action program and using that program to track and document associated information. The inspector considered that, although issuing this procedure was not identified as a corrective action to prevent recurrence, compliance with this procedure will effectively supplement the actions described above to prevent recurrence.

.02 Timely Corrective Action

In AR 114576, the licensee characterized this issue as *"Maintenance and Engineering organizations accepted degraded conditions and performance of the jacket water system",* and completed the following three corrective actions to prevent recurrence:

- Install new couplings on JWC piping,

- Discuss this event with Maintenance personnel, focusing on reinforcing related expectations, and

- Provide training to Engineering personnel on operability determinations, and on proper investigation of repetitive equipment concerns.

The inspector determined that the actions described in AR 114576 by themselves may not be adequate to prevent recurrence of this issue. However, the inspector also determined that procedure OI-01.19 includes features which address this issue, and that compliance with procedure 0OI-01.19 will effectively supplement the actions identified above to prevent recurrence.

.03 Functional Verification

The associated corrective action was to revise their work-control procedure to require a Senior Reactor Operator to provide input to functional verification for minor-maintenance work, and to approve that work. This corrective action was completed in a timely manner.

The evaluation described no quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence. However, this evaluation is subject to an effectiveness evaluation required by their corrective-action program. The generic template used for that effectiveness evaluation requires a subjective assessment of the collective barriers in place to prevent recurrence of the

event. It also requires a review of corrective-action data and interviews with personnel to confirm that a repeat event has been prevented.

.04 Missing Supports

Through the work-control process, the licensee took immediate corrective action to replace the missing supports to stop the leak from the EDG-3 JWC piping. For the missing support on one other EDG, the licensee promptly assessed that EDG as operable, and replaced the missing support through the work-control process during the next scheduled work window for that EDG.

The evaluation identified no actions to prevent recurrence of this issue. The evaluation justified that with the statement *"The current improved work control practices should prevent these supports from being removed in the future."* The evaluation did not support or expand this statement. In response to the inspectors' request for support for that statement, the licensee developed a list of differences in the maintenance process between the past and the present. That list included the following:

- The work process in present places a much heavier emphasis on human performance than in the past.
- The current use of electronic databases facilitates better access to information in the present than in the past.
- The advent of the maintenance rule has focused more oversight on SSCs in the present than in the past.
- The NRC performance-indicator program ensures engineers are more engaged in oversight of SSCs than in the past.
- Present work practices require Operations involvement in approving work orders, while that wasn't true in the past.
- Current work-related policies rely more on strict adherence to procedures and work-order instructions than on skill-of-the-craft, while past policies relied more on skill-of-the-craft.

Considering that removal of the supports occurred in the past, and in the absence of any indication that current work practices and processes contributed to this issue, the inspector determined that these differences adequately justify taking no corrective actions to prevent recurrence.

02.04 Summary

All performance issues identified by the NRC were also identified by the licensee, either as conditions adverse to quality, or as causes of those conditions. In addition, the licensee adequately analyzed the circumstances associated with those issues and, where appropriate, took effective immediate corrective action. Also, the licensee developed adequate corrective actions to prevent recurrence, and scheduled timely completion of those actions.

03 OTHER ACTIVITIES

03.01 Event Followup

a. (Closed) Licensee Event Report (LER) 05000325,05000324/2004001-00, Emergency Diesel Generator No. 3 Condition Prohibited by Technical Specifications.

On January 4, 2004, the licensee identified a jacket water system piping leak of sufficient quantity to render emergency diesel generator (EDG) no.3 inoperable. The associated past-operability review determined that the subject leak had existed since December 8, 2003, and that EDG no. 3 had therefore been inoperable for a time longer than allowed by the plant's Technical Specifications. The licensee documented the leak in AR 114576. The inspector reviewed the licensee's corrective actions delineated in the LER and determined that the actions were adequate. The corrective actions were completed within and in accordance with the licensee's corrective action program. No findings of significance were identified by the inspector's review of this LER. This LER is closed.

b. (Closed) VIO 05000324/2004008-01 (EA-04-076) Failure to Promptly Correct EDG Jacket Water Coolant Leakage.

This violation was described in NRC inspection report 05000324/2004008, for the licensee's failure to promptly correct a condition adverse to quality. The corrective actions associated with this violation are discussed within this report, and this VIO is closed.

04 MANAGEMENT MEETINGS

Exit Meeting Summary

The inspector presented the inspection results to Mr. E. O'Neil, Ms. A. Pope, Mr. D. Dicello, Mr. B. Kitchen, and other members of licensee management at the conclusion of the inspection on December 10, 2004. The inspector confirmed that proprietary information was not provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

L. Beller, Regulatory Affairs Supervisor
C. Cashwell, Corrective Action Program Supervisor
R. Cusick, Emergency Diesel Generator System Engineer
J. Frisco, Mechanical Maintenance Superintendent
M. Grantham, Superintendent of Design Engineering
B. Kitchen, Engineering Manager
N. Smith, Electrical and Instrumentation & Controls Engineering Superintendent
S. Tabor, Regulatory Affairs Engineer
T. Ward, Maintenance Rule Program Manager
M. Williams, Operations Manager

NRC Personnel

G. DiPaolo, Senior Resident Inspector, Brunswick
P. Fredrickson, Branch Chief, Division of Reactor Projects, Region II

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened and Closed

None

Closed

05000325, 05000324/2004001-00	LER	Emergency Diesel Generator No. 3 Condition Prohibited by Technical Specifications
05000324/2004008-01 (EA-04-076)	VIO	Failure to Promptly Correct EDG Jacket Water Coolant Leakage

Discussed

None

LIST OF DOCUMENTS REVIEWED

Action Requests

91584, [Performance Evaluation Section Self-Assessment] Corrective Action Program Culture [Item for Management Consideration] 2
114663, Missing Support Bracket on [Diesel Generator] 1 Jacket Water Piping to Turbo
114722, Lessons Learned from Emergent [Diesel Generator] 3 Outage
114946, [Diesel Generator] 3 Jacket Water Leak
124674, [Nuclear Assessment Section Assessment] B-OM-04-01-W2, Maintenance Rework Program
130157, Effectiveness of Follow-Up Actions for the [Emergency Diesel Generator]3 Jacket Water Leak
133163, [Self-Assessment] 130157 [Weakness] 1: Actions Associated with [Diesel Generator]3 Dresser Coupling
133165, [Self-Assessment] 130157 [Weakness] 2: Action Statements Not Effectively Tracked
133169, [Self-Assessment] 130157 [Weakness] 3: Event Analysis Inadequacies Noted
146085, 0OI-01.19, Rev. 0, Operability Determinations

Procedures

CAP-NGGC-0200, Corrective Action Program, Rev. 13
ADM-NGGC-0104, Work Management Process, Rev. 27
CAP-NGGC-0205, Significant Adverse Condition Investigations, Rev. 2
0OI-01.19, Operability Determinations, Rev. 0

Other Documents

Engineering Change Request 3734, [Emergency Diesel Generator] Jacket Water Dresser Fitting Replacement
Engineering Change 58036, [Emergency Diesel Generator] Jacket Water Dresser Fitting Replacement (excerpts)
Control-room operator logs for 12/7/2003 & 1/4/2004-1/6/2004
Minutes from meetings 04-02 and 04-25 of the Plant Nuclear Safety Committee
Emergency Diesel Generator No. 3 JWC, a presentation delivered by licensee management to NRC Region II management, during a regulatory conference held on May 19, 2004.
Operability Determinations, a presentation delivered by the Engineering Manager to Engineering personnel on December 9, 2004.
Work Package Standard, Rev. 1
Agenda for Cycle 1 2005 ESP Continuing Training