



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

April 9, 2008

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC PROBLEM IDENTIFICATION  
AND RESOLUTION INSPECTION REPORT NOS. 05000325/2008006 AND  
05000324/2008006

Dear Mr. Waldrep:

On February 29, 2008, the US Nuclear Regulatory Commission (NRC) completed a team inspection at your Brunswick Units 1 and 2 facilities. The enclosed report documents the inspection findings, which were discussed on February 29 and April 7, 2008, with you and other members of your staff.

The inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems, and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection involved examination of selected procedures and records, observations of activities, and interviews with personnel.

On the basis of the sample selected for review, the team concluded that in general, problems were properly identified and evaluated, and corrected. The thresholds for identifying and classifying issues were appropriately low. However, the team did identify several instances of equipment problems involving potential adverse conditions to quality affecting risk significant systems that had not been entered into the corrective action program. Furthermore, several instances were identified where adverse conditions to quality were not adequately evaluated, and/or the associated corrective actions were not implemented, in an adequate and timely manner. Consequently, the ineffective and incomplete corrective actions allowed degraded equipment performance and/or conditions to continue uncorrected for an extended period of time. Based upon the results of this inspection, we have determined that another Problem Identification and Resolution Inspection, normally a biennial inspection, will be performed at Brunswick in April 2009.

This report documents two NRC identified findings that were evaluated under the significance determination process as having very low safety significance (Green). These findings were determined to involve violations of NRC requirements. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs), in accordance with Section VI.A of the NRC's Enforcement Policy. If you contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control

Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at the Brunswick Steam Electric Plant.

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 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 Nos.: 50-325, 50-324  
License Nos.: DPR-71, DPR-62

Enclosure: Inspection Report 05000325, 324/2008006  
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Senior Resident Inspector at the Brunswick Steam Electric Plant.

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Letter to Ben Waldrep from Randall Musser dated April 9, 2008

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC PROBLEM IDENTIFICATION  
AND RESOLUTION INSPECTION REPORT NOS. 05000325/2008006 AND  
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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-325, 50-324

License Nos: DPR-71, DPR-62

Report Nos: 05000325/2008006 and 05000324/2008006

Licensee: Carolina Power and Light (CP&L)

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: 8470 River Road SE  
Southport, NC 28461

Dates: February 11 - 15 and February 25 - 29, 2008

Inspectors: T. Ross, Senior Resident Inspector, Browns Ferry (Team Lead)  
J. Polickoski, Resident Inspector, Summer (Asst. Team Lead)  
J. Austin, Senior Resident Inspector, Brunswick  
R. Hagar, Senior Resident Inspector, Robinson  
M. King, Resident Inspector, Harris  
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Approved by: Randall A. Musser, Chief  
Reactor Projects Branch 4  
Division of Reactor Projects

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## SUMMARY OF FINDINGS

IR 05000325/2008006, 05000324/2008006; 02/11-15/2008, 02/25-29/2008; Brunswick Steam Electric Plant, Units 1 and 2; Biennial baseline inspection of the identification and resolution of problems. Two non-cited violations (NCVs) were identified in the area of ineffective and untimely completion of corrective actions.

The inspection was conducted by three Senior Resident Inspectors, two Resident Inspectors, and a Senior Project Inspector. Two Green NCVs were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (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.

### Identification and Resolution of Problems

Overall, problems were adequately identified and evaluated, and effective corrective actions were implemented. Site management was actively involved in the corrective action program (CAP) and focused appropriate attention on significant plant issues.

In general, the threshold for initiating action requests (ARs) was appropriately low, as evidenced by the type of problems identified and large number of ARs entered annually into the CAP. Action requests normally provided complete and accurate characterization of the problem. Employees were encouraged by management to initiate ARs. However, a number of equipment problems were identified by the inspectors involving selected risk significant safety-related systems, primarily during system walkdowns, that were not already entered in the CAP. This area warrants additional attention by licensee management to ensure all safety issues that could adversely affect quality are addressed by the CAP.

Identified problems were adequately prioritized consistent with the licensee's CAP guidance. The age and extensions for completing evaluations were closely monitored by plant management, both for high priority nuclear condition reports (NCRs), as well as for adverse conditions of less significant priority. Overall, the licensee's evaluation of issues in the CAP were considered to be acceptable. Also, the technical adequacy and depth of evaluations (e.g., root cause investigations) were typically adequate. However, several inconsistencies were noted in the thoroughness and completeness of the cause evaluations, which could have resulted in unresolved issues with incomplete corrective actions.

Corrective actions were generally timely, effective, and commensurate with the safety significance of the issues. However, two instances of inadequate and untimely corrective actions were identified that allowed unresolved conditions adverse to quality to remain uncorrected involving degraded equipment performance and/or conditions of risk significant, safety related systems. In addition, several other observations of untimely, incomplete, and/or inadequate corrective actions were identified by the inspectors that did not represent an immediate and/or significant safety concern but reflected a lack of attention to detail in the implementation of corrective actions. The operating experience program was effective in

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screening operating experience for applicability to the plant, entering items determined to be applicable into the CAP, and taking adequate corrective actions to address the issues. External and internal operating experience was adequately utilized and considered as part of formal root cause evaluations for supporting the development of lessons learned and corrective actions for CAP issues.

The licensee's audits and self-assessments were critical, effective, and persistent at identifying issues and entering them into the corrective action program. These audits and assessments identified issues similar to those identified by the NRC with respect to untimely and ineffective implementation of corrective actions. Effectiveness reviews for root cause evaluations were generally comprehensive, detailed, and correctly identified significant CAP implementation deficiencies. However, corrective actions developed as a result of these assessments and audits were not always effective.

Based on general discussions with licensee employees during the inspection, targeted interviews with plant personnel, and reviews of selected employee concerns records, the inspectors determined that licensee personnel were generally willing to identify safety issues, and that most were confident that identified issues would be properly addressed and resolved. However, the inspectors found several indications that some licensee personnel may be reluctant to report safety issues. Furthermore, the inspectors also determined that plant employees using the employee concerns program were reluctant to identify themselves, and the licensee's most-recent safety culture assessment had failed to recognize several of the observations made by the inspectors.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Barrier Integrity

Green. The inspectors identified a Green non-cited violation of 10 CFR 50 Appendix B, Criterion XVI, Corrective Action, for failure to correct a condition adverse to quality (i.e., design deficiency) which led to multiple and repetitive failures of the main steam isolation valves (MSIVs). The March 2007 failure of the 2-B21-F028A outboard MSIV to pressurize during local leak rate testing (LLRT) exhibited similar symptoms to previous MSIV failures which occurred over the period from 2003 to 2006. The inspectors identified a number of missed opportunities by the licensee to properly identify and correct the failure mechanism (i.e., design deficiency) which led to the most recent failures. The licensee has entered this issue into the corrective action program as nuclear condition report 267744, and was evaluating their plans to improve MSIV performance.

This finding is of greater than minor safety significance because it was associated with the Containment Barrier Performance attribute of the Barrier Integrity Cornerstone, and adversely affected the cornerstone objective of containment isolation reliability to protect the public from radiological releases caused by accidents or events. The finding was determined to be of very low safety significance because there was no loss of safety function (i.e., simultaneous failure of both the inboard and outboard MSIVs) that resulted in an actual open pathway in the physical integrity of containment. This finding has a cross-cutting

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aspect in the area of Problem Identification and Resolution because the licensee did not take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity, regarding an adverse trend of continuing MSIV LLRT failures. (P.1.(d)) (Section 4OA2.a(3)(i)).

#### Cornerstone: Mitigating Systems

Green. The inspectors identified a Green non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, for the inadequate evaluation and corrective actions to address a condition adverse to quality involving degraded performance of the 1A Residual Heat Removal (RHR) Heat Exchanger (HX) due to Service Water (SW) fouling. The licensee documented this issue in their corrective action program as nuclear condition report 268318. The licensee also performed an operability evaluation of the RHR system, and instituted compensatory measures until the condition could be corrected during the Spring 2008 Unit 2 outage.

The finding is more than minor because if left uncorrected, the issue would become a more significant safety concern in that the potential existed for making the 1A RHR HX inoperable due to tube sheet fouling. In addition, the inspectors also determined that this issue was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The finding was determined to be of very low safety significance because the degraded condition did not actually result in a loss of the RHR system safety system function. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution because the licensee did not take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity, in that the licensee did not promptly address an adverse trend in the 1A RHR HX's performance. (P.1.(d)) (Section 4OA2.a(3)(ii)).

#### B. Licensee Identified Violations

A violation of very low safety significance, which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation is listed in Section 4OA7.

## REPORT DETAILS

### 4. OTHER ACTIVITIES (OA)

#### 4OA2 Identification and Resolution of Problems

##### a. Assessment of the Corrective Action Program

###### (1) Inspection Scope

The inspectors reviewed the licensee's corrective action program (CAP) procedures, including CAP-NGGC-200, Corrective Action Program, Revision (Rev.) 19, which described the process for documenting and resolving issues via Nuclear Condition Reports (NCRs) that are tracked as Action Requests (ARs). The inspectors then selected and reviewed specific plant problems associated with the seven NRC cornerstones of safety to determine if problems were being properly identified, characterized, and entered into the CAP for timely and complete evaluation and resolution. In particular, the inspectors selected and reviewed approximately 130 NCRs primarily initiated by the licensee during the period from January 2007 to February 2008. This period of time was purposefully chosen to segue with the last Biennial Problem Identification and Resolution (PI&R) inspection conducted in February 2007. Furthermore, in the light of this inspection, and other significant NRC inspections conducted in 2007 (e.g., Supplemental Inspection 95001 and 95002), the inspectors focused their sample selections on the highest priority NCRs (i.e., Priority 1 and 2) with an emphasis on the effectiveness of the licensee's implementation of corrective actions.

Within constraints described above, the inspectors selected NCRs from principally three specific areas of concern. The first area involved any equipment problems associated with four risk-significant systems not recently inspected, which included the residual heat removal (RHR) system, core spray (CS) system, Primary and Secondary Containment, and the Supplemental Spent Fuel Pool Cooling (SSFPC) system. However, since these systems had not been reviewed by the last Biennial PI&R inspection, the inspectors did select NCRs for review going back at least two years. Secondly, in order to confirm that NCRs were being initiated and processed at a site-wide level and to ensure all cornerstones were being covered, the inspectors selected a representative number of NCRs that were identified by, and assigned to, several major plant departments including security, emergency planning and health physics. For the third area, the inspectors chose numerous non-cited violations (NCVs), licensee identified violations (LIVs), and Licensee Event Reports (LERs), to verify the effectiveness of the licensee's CAP implementation regarding NRC inspection findings and reportable events issued since the previous 2007 PI&R inspection.

The inspectors also conducted walkdowns of applicable portions of the RHR, CS, SSFPC, and Containment systems to verify that problems had been properly identified, entered and prioritized in the CAP. System performance was reviewed by discussion with system engineers and by review of work requests (WRs), maintenance rule data, and system health reports to verify that equipment deficiencies were being appropriately

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entered into the CAP. In addition, the inspectors attended various CAP review and process meetings such as the Corrective Action Review Board (CARB), Daily NCR Review Meeting, and Weekly CAP Review meeting, to observe management oversight of the corrective action process.

In addition, to the normal biennial PI&R inspection scope, this inspection was a followup to the recent Inspection Procedure (IP) 95002 Supplemental Inspection conducted in the summer of 2007. More specifically, this inspection examined the issues raised by the IP 95002 inspection team as documented by unresolved item (URI) 05000325, 324/2007010-01, Handling of Diesel Generator Problems by CAP, in NRC inspection report (IR) 05000325/2007010 dated October 11, 2007.

Furthermore, the inspectors verified that issues identified by internal and external operating experience, licensee audits and self-assessments, and employee concern program were entered into and dispositioned by the CAP, as appropriate.

Lastly, the inspectors interviewed plant personnel, both formally and informally, about the safety-conscious work environment (SCWE) at the site.

Documents reviewed partially or in their entirety during this inspection are listed in the Attachment.

## (2) Assessment

Identification of Issues: In general, the team determined that the licensee was effective at identifying problems and entering them into the CAP. The threshold for entering issues into the CAP was appropriately low and employees were encouraged to initiate NCRs and WRs. However, based on the walkdowns of the four risk-significant plant systems selected for detailed review, and interviews with system engineers, the team identified a number of deficiencies that were not captured in the CAP, as described below. The number and significance of inspector identified problems not already entered in the CAP, warrants additional attention by licensee management to ensure safety issues that could adversely affect quality are addressed by the CAP. The licensee entered this issue into the CAP as NCR 273987.

- Four of the eight Unit 1 and 2 Residual Heat Removal (RHR) pump flanges showed evidence of recent leakage. While the 2B RHR pump leak between the upper end head and the pump casing was documented in NCR 227656 during a previous outage, the 1A, 2A, and 2D RHR pump flanges were neither identified through an extent of condition evaluation of the 2B RHR pump issue nor through previous system walkdowns by Operations or Systems Engineering. The licensee initiated NCR 267783 to address this issue and evaluated that there was no impact to the operability of any RHR pump.
- The initial extent of condition review for the four RHR pump flange leakages noted above revealed that none of the four sources of leakage were identified, tracked, or monitored in the site's Alternate Source Term (AST) Combined Leakage Log as required by OAP-054, Plant Leak Management, revision 4. Further extent of condition

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evaluation revealed additional existing work orders of previously identified AST contributing leaks that were also not entered into the AST Combined Leakage Log. The licensee initiated NCR 268188 to address this issue and determined that there was no impact to the AST leakage limits as stated in the UFSAR section 15.6.4.3.2 nor to the operability of any affected system. The existence of at least these seven work orders regarding AST contributing leaks questioned the effectiveness of the licensee's program for tracking and monitoring potential containment bypass leakage into the secondary containment.

- The 1A RHR Heat Exchanger (HX) room roof displayed evidence of past leakage to include the formation of stalactites hanging from the roof and noticeable water streaming stains on the 1A RHR HX piping. The roof leakage appeared to leak onto an RHR pipe insulation seam. Further review revealed that the leak had been known to exist from 2003-2006, was subsequently repaired, and evaluated for Unit 1 secondary containment margin. However, the inspectors determined that the previous licensee evaluations did not identify nor consider RHR pipe corrosion as an extent of condition even though the leak was pervasive in nature (at least 3 years old) and impacted an insulation seam on a portion of RHR piping that was not continuously heated. The licensee initiated NCR 267784 to address this issue.
- Several housekeeping concerns were identified to include tools and foreign material left unsecured in contaminated areas and two improperly controlled ladders per OMMM-022, Instructions for Placement of Temporary Loads, found in close proximity to the 1A RHR pump equalizing line and the 2A RHR HX. The licensee initiated NCR 266483 to address these issues.
- A review of the service air upgrade completion for the 1D Service Air Compressor revealed that the existing post maintenance test (PMT) only required one compressor start which was inadequate to test the resetting of various interlocks and relays for subsequent compressor starts. This testing inadequacy was confirmed by the failed second start of the 1D Service Air Compressor as documented by Operations in NCR 262942. With more compressors slated for this service air upgrade, the PMT had yet to be updated to reflect the testing inadequacy revealed by the 1D Service Air Compressor. The licensee initiated NCR 267540 to address this issue.
- The Unit 1 High Pressure Coolant Injection (HPCI) pump room high energy propagation door was found closed but unsecured. The licensee initiated NCR 266298 to address this issue and evaluated there was no immediate operability concern as the door latch mechanism was still functional and the swing of the door relative to the source of the high energy in an event would have kept the door shut.
- During inspector walkdowns of the CS system, numerous minor equipment problems were identified - a) Oil seepage from motor operated valve (MOV) 2-E21-F001B actuator (WR 324326 initiated); b) Paint on valve stem threads for MOV 1-E21-V19 (WR 324238 initiated); c) Leaking sight glass on Unit 1A CS pump 1-E21-C001A (WR 324230 initiated); d) Small packing leak on valve 2-E21-F002B (WR 324324 initiated); and, e) Missing safety screen on Unit 2B CS pump 2-E21-C001B (WR 324329 initiated and area roped off).

Prioritization and Evaluation of Issues: In general, the team determined that problems were adequately prioritized and entered into the CAP consistent with the licensee's CAP guidance. The team noted that untimely evaluations and requests for extensions were being actively discouraged and closely monitored by plant management, both for high priority NCRs, as well as for adverse conditions of less significant priority. Overall, the licensee's evaluation of issues in the CAP was considered to be effective. Also, the technical adequacy and depth of evaluations (e.g., root cause investigations) were typically adequate. However, some inconsistencies were noted in the thoroughness and completeness of the cause evaluations, which could have resulted in unresolved issues with incomplete corrective actions. Examples illustrating this problem included the following:

- NCR 252517 (Priority 2) – Foreign Material Found in the 2B Turbine Building Closed Cooling Water (TBCCW) Heat Exchanger (HX). The inspectors' review of the Adverse Condition Investigation Form and additional interviews with licensee staff revealed that no operability determination was made after the licensee found foreign material inside the tube side (service water side) of the TBCCW heat exchanger (2-TCC-2B-HX) in October 2007. The rubber material found in the heat exchanger was believed to be coming from a degraded rubber lined service water elbow upstream of safety related components potentially vulnerable to foreign material. Three levels of licensee reviews failed to identify the potential operability concern as required by CAP-NGGC-200, Corrective Action Program. Additionally, the licensee's work management process failed to adequately prioritize the work orders to inspect the potentially degraded rubber lined elbows when they rejected a request by the responsible system engineer to expedite the work orders. This failure to identify the potential challenge to operability of safety related components in the service water system due to foreign material found in non-safety related components represented a potential weakness in the licensee's evaluation of foreign material issues. The licensee initiated NCR 267781 to address this issue. Subsequent inspections of the rubber lined elbows revealed no degradation and the rubber material found in the heat exchanger was determined to be legacy material from an earlier documented failure of a rubber lined elbow where the missing material was never retrieved.
- NCR 221310 (Priority 2) - Regulatory Required Instrument List (RRIL) Was Incomplete. The inspectors' review determined the scope of licensee's evaluation was inadequate and untimely. Subsequently, the licensee began conducting further evaluations to properly identify the scope of the RRIL, and address how to maintain the equipment design basis current. The licensee initiated NCR 267215 to address this issue. This matter will be discussed in further detail in IR 05000325,324/2008002.
- NCR 215809 (Priority 1) - Inadvertent Control Rod Insertion for Failure to Follow Work Management Process (NCV 05000325/2006005-02). The inspectors' review of the Significant Adverse Condition Investigation Report and additional interviews with licensee staff revealed that the root cause investigation did not adequately address organizational weaknesses as required by CAP-NGGC-205, Significant Adverse Condition Investigations. Specifically, the inspectors identified weaknesses and potential barriers missed in work planning, the pre-job brief, work control, the scope

of “minor maintenance,” the interaction between the technician and the system engineer, and missed opportunities for peer checks. Consequently, additional corrective actions may be warranted following a further review of organizational effectiveness. The licensee initiated NCR 267271 to address these issues.

- NCR 226451 (Priority 1) - Incorrect Fuel Assembly Moved to Core (NCV 05000325/2007002-01). The inspectors’ review of this Significant Adverse Condition Investigation Report and interviews with licensee staff revealed that the root cause investigation did not adequately address the failure of previous corrective actions to prevent recurrence following three prior fuel handling events dating back to 2003. The inspectors concluded that while the four events did not share the same specific causal mechanism, each fuel handling event provided substantive internal operating experience regarding the challenges and difficulties that adversely affected the licensee’s ability to properly manage and oversee fuel handling operations, that effective corrective actions could have been developed in a more timely manner to prevent recurrence.

Effectiveness of Corrective Actions: Overall, corrective actions developed and implemented for problems were generally appropriate to the problem. However, two examples of inadequate and untimely corrective actions were identified that allowed unresolved conditions adverse to quality on risk significant, safety related systems to remain uncorrected. These examples were as follows:

- 1A RHR heat exchanger service water fouling, see finding below.
- Repetitive Main Steam Isolation Valve (MSIV) local leakrate testing (LLRT) failures, see finding below.

In addition, several other negative observations of untimely, incomplete and/or inadequate corrective actions were identified by the inspectors that did not represent an immediate and/or significant safety concern but reflected a lack of attention to detail in the implementation of corrective actions. These issues included the following:

- NCR 129124 (Priority 1) - Site Alignment Meeting Effectiveness. During a PES Nuclear Safety Culture Assessment in February 2007 an issue (PES 06-12-SP-B-1) was identified regarding the effectiveness of the site alignment meeting and the discipline of the organization when pursuing emergent plant issues. The inspectors’ review of the associated corrective actions to address the PES Issue concluded that one of the corrective actions (CORR) was not implemented as described. According to the CORR (NCR assignment #6), a monthly critique of the site alignment meeting performance would be led by the Operations manager for the first year. This CORR was closed out as complete on April 26, 2007. However, no such critiques were conducted. To address this omission the licensee initiated NCR 267543.
- NCR 238802 (Priority 1) - NAS Assessment of the Emergency Preparedness (EP) Corrective Action Program. The inspectors’ review of the Significant Adverse Condition Investigation Report (root cause level investigation) and

interviews with licensee staff revealed that the corrective action to prevent recurrence (CAPR) to provide evaluation training to the EP group and to establish recurring training was closed as completed without the training being performed nor recurring training established. The licensee initiated NCR 267739 to address this issue.

- NCR 234489 (Priority 1) - Recurring Corrective Action Program Deficiencies. A root cause investigation was conducted to address numerous NCRs that were initiated regarding ineffective implementation of the CAP. The inspectors' review of the associated corrective actions identified two deficiencies. First, CAPR #1 specified that continuing training for the management team of what "good CAP looks like" would be established. However, after the initial training was conducted no mechanism was put in place to ensure continuing training of the management team. The licensee initiated AR/NTM 268063 to address this issue. Secondly, CORR #4 specified that updated classroom "Investigation Training" would be provided for Brunswick supervision and management that approve investigations. However, no root cause investigation training was planned or scheduled for numerous key managers (e.g., CARB members, management sponsors) responsible for reviewing and approving root cause investigations. The licensee added another corrective action assignment #24 to NCR 234489 to address this issue.
- NCR 212509 (Priority 1) – Unit 2 Manual Scram Due To Condensate Conductivity Increase (LER 50-324/2006-002). The inspectors' review of the Significant Adverse Condition Investigation Report and interviews with licensee staff revealed that the specified corrective actions failed to address the recurring nature of this event. The root cause recognized that this event was a repeat of an event in 2004 (NCR 135131), and that the corrective actions to prevent recurrence were inadequate. However, contrary to CAP-NGGC-0200 and 0205, NCR 212509 did not evaluate or institute corrective actions to address the cause of the ineffective corrective actions of NCR 135131. The licensee initiated NCR 274013 to address this issue.
- NCR 238538 (Priority 2) - Unit 1 Condensate Storage Tank (CST) Level Switch Pipe Union Leakage Following Installation. The inspectors' review of the Adverse Condition Investigation Report (apparent cause level investigation) and interviews with licensee staff revealed that the NCR was closed without assigning further corrective action to procurement. Specifically, the NCR investigation identified the cause of the pipe union leak to be inadequate vendor quality in the machining of the pipe union threads, but no further corrective action assignment was made to procurement to investigate and potentially correct the vendor quality problem. The licensee initiated NCR 268213 to address this issue.

(3) Findings

- (i) Introduction: The inspectors identified a Green non-cited violation of 10 CFR 50 Appendix B, Criterion XVI, Corrective Action, for failure to correct a condition adverse to quality (i.e., design deficiency) which led to multiple and repetitive failures of the main

steam isolation valves (MSIVs).

Description: During MSIV testing on March 4, 2007, the 2-B21-F028A outboard MSIV failed to pressurize during its LLRT. The licensee initiated AR 00224481 following the LLRT failure and performed an adverse condition investigation. This adverse condition investigation determined that the cause for the MSIV failure was excessive wear on the internal guide surfaces. The inspectors performed a review of the MSIV corrective action history and identified several previous performance problems with the MSIVs. Based on historical evidence the inspectors determined that the licensee had experienced at least three other MSIV failures since 2003 which exhibited symptoms similar to the failure in March 2007. Table 1 (below) summarizes the previous similar MSIV failures.

Table 1: Recent Similar MSIV Failures at Brunswick

Unit 2/ F028A	03/03	Would not pressurize.	Wear of the internal guide surfaces creating excessive clearances.
Unit 2/ F028A	03/05	Would not pressurize.	Wear rub that prevented the main disk from aligning the valve seat above the guide pads.
Unit 1/ F028A	03/06	Would not pressurize.	Slight offset in perpendicularity from the bore to the seat.

The specifics of these examples are discussed below.

- On March 8, 2003, AR 00086919 was written due to an LLRT failure of 2-B21-F028A, Outboard MSIV. Leak rate testing of the 2-B1-F028A MSIV revealed that the valve would not pass in accordance with OPT-20.3a.5. This procedure required a leak rate of less than 100 scfh when tested at >25 psig test pressure. The test pressure could not be achieved nor could a leak rate be measured when testing valve F028A. It was determined by the licensee that vibration contributed to the valve's internals becoming misaligned creating excessive clearances. The cause of the vibration and subsequent misalignment of valve internals was an industry known design deficiency with the MSIVs. During this time the licensee made a decision to install a new main disk/stem assembly to restore diametrical clearances and lap the seat (conventional repair), as opposed to the industry OE recommended guide pad modification which would have corrected the design deficiency. After conventional repair of the valve was performed the valve was re-pressurized and passed its LLRT with successful results. The inspectors concluded that based on MSIV performance history and industry OE the licensee had an opportunity to resolve the design deficiency and its potential problems.
- On March 6, 2005, AR 00152859 was written due to a LLRT failure of 2-B21-F028A, Outboard MSIV, when the valve failed to pressurize. This valve was in service only one cycle since its last failed LLRT in March 2003. The initial inspection of the valve found a wear rub that prevented the main disk from aligning into the valve seat above the guide pads. The main disk was weld repaired with stellite, and machined to an acceptable dimension to maintain vendor recommended clearances (conventional repair). The valve

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was reassembled and re-pressurized with a successful LLRT on March 18, 2005. The inspectors concluded that this was another opportunity for the licensee to resolve the MSIV design deficiency using the guide pad modification.

- On March 7, 2006, AR 00186771 was written due to an LLRT failure of 1-B21-F028A, Outboard MSIV, when the valve failed to pressurize. The valve was disassembled and the licensee determined the cause of the failure to be a slight offset in perpendicularity from the bore to the seat. To correct this condition, a pad was welded into the valve bore where the upper portion of the main disc piston rests when the valve is closed (conventional repair). The seats were then lapped and the valve was reassembled. The valve was then tested satisfactorily. The inspectors concluded this was an additional opportunity for the licensee to fully investigate and resolve this persistent problem.

From a review of the MSIV failures which occurred from March 2003 to March 2007, the inspectors concluded that the licensee had multiple opportunities to correct an industry recognized MSIV design deficiency. However the licensee chose to perform conventional repairs in lieu of addressing the known design deficiency. [Note, after three successive LLRT failures, MSIV 2-B21-F028A was physically modified to resolve the existing design deficiency.] Furthermore, the inspectors reviewed the MSIV LLRT history at Brunswick and identified 26 MSIV LLRT failures (i.e., failure to pressurize) which occurred from 1987 to 2007. In the majority of these cases the licensee chose to perform a conventional repair as opposed to implementing the guide pad modification to correct the design deficiency. Although the MSIVs at Brunswick have experienced a high number of failures historically, and still experience at least one failure every outage, the licensee had no specific plans or schedule to permanently resolve the MSIV design deficiency for those MSIVs that have not received the guide pad modification. The inspectors concluded the licensee had multiple opportunities to fully investigate and resolve the MSIV design deficiencies that continue to result in ongoing LLRT failures.

Analysis: The inspectors concluded that the licensee failed to take adequate corrective actions to resolve safety related MSIV failures due to a known design deficiency. This conclusion was based on the licensee's history of MSIV failures; the maintenance history of the MSIVs; the previously instituted corrective actions; the lack of any formalized plan or schedule to correct the MSIV design deficiency; and the availability of applicable industry and vendor experience. The licensee's inadequate and untimely corrective actions, which resulted in multiple, continuing MSIV LLRT failures was considered to be a performance deficiency.

This finding is of greater than minor safety significance because it was associated with the Containment Barrier Performance attribute of the Barrier Integrity Cornerstone, and adversely affected the cornerstone objective of containment isolation reliability to protect the public from radiological releases caused by accidents or events. The finding was evaluated using Phase 1, Initial Screening and Characterization of Findings, of the Significance Determination Process of Inspection Manual Chapter 0609 and determined to be of very low safety significance because there was no loss of safety function (i.e., simultaneous failure of both the inboard and outboard MSIVs) that resulted in an actual open pathway in the physical integrity of containment. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution because the licensee did not

take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity, regarding an adverse trend of continuing MSIV LLRT (P.1.(d)).

Enforcement: On March 4, 2007, Outboard MSIV, 2-B21-F028A, failed an LLRT due to excessive wear on the internal guide surfaces. 10 CFR Part 50, Appendix B, Criterion XVI, requires that measures shall be established to assure that conditions adverse to quality, such as failures and deficiencies, are promptly identified and corrected. Contrary to this requirement, the licensee continued to experience MSIV LLRT failures as a consequence of a known design deficiency, as exhibited during the last three Unit 2 outages and the last Unit 1 outage, but has failed to correct this persistent condition adverse to quality. This violation, which was determined to have very low safety significance and was entered into the licensee's corrective action program as NCR 267744, is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000325,324/2008006-001, Failure to Correct a Condition Adverse to Quality Involving an MSIV Design Deficiency.

- (ii) Introduction: The NRC identified a Green non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, for the licensee's failure to adequately evaluate and take prompt and adequate corrective actions to address a condition adverse to quality related to degraded 1A Residual Heat Removal (RHR) Heat Exchanger (HX) performance due to service water fouling.

Description: During the Unit 2 outage in March 2007, the licensee performed an inspection that discovered a build-up of oyster shells and barnacles in a typically stagnant 24-inch header of the Conventional Service Water (CSW) system. This CSW header ties in to the "A" Residual Heat Removal Service Water (RHRSW) vital header that can supply cooling water during accident conditions to the safety-related 2A RHR HX. The licensee performed an operability determination and an adverse condition investigation using Priority 2 NCR 224737 to evaluate the Unit 2 RHR HX's, and the extent of condition for Unit 1. The inspectors interviewed personnel and performed a review of the operability determination and adverse condition investigation associated with this issue.

In the past, the chlorination system that was used to control biological growth in the service water (SW) system underwent a major modification due to identified problems with the original chlorination system that affected control room habitability and emergency diesel generator (EDG) operability. The temporary chlorination system, that was installed in March 2006 and used until the permanent, upgraded system could be installed (October 2007), was found to provide unquantifiable and unreliable amounts of chlorine into the in-line SW stream. Upon discovery, the licensee realized there was a potential for low flow and/or stagnant portions of the Nuclear Service Water (NSW) and CSW pipe headers to have received little or no chlorine to stem biological growth. Following this realization, the licensee initiated batch additions of chlorine to potentially affected areas in an attempt to kill the biologics. The Unit 2 CSW 24-inch header inspection in March 2007 confirmed that chlorine concentration had been too low in this stagnant header which allowed oyster and barnacle growth. But this inspection

confirmed that the subsequent chlorine batch additions were successful since all of the shells discovered were dead.

The operability determination associated with NCR 224737 evaluated the past operability of the Unit 2 RHR HX's. Both the Unit 2 CSW header and RHR HX's were thoroughly cleaned during the March 2007 outage. As part of an extent of condition, the licensee also evaluated the past, present, and future operability of the Unit 1 CSW header and its related RHR HX's (which had not been cleaned). This operability determination concluded that the 1A RHR HX was the most limiting and susceptible due to the following reasons: the similar CSW 24-inch stagnant pipe header is approximately 200 feet longer on Unit 1 than Unit 2 which provides the potential for a greater amount of dead shells on Unit 1; the known flow rates in the header of up to 8 feet/sec were capable of lifting the dead shells to transport them to the RHR HX's; and the 1A RHR HX was reviewed as having had the highest increase in recorded differential pressure during quarterly HX performance tests.

The Unit 1 operability determination also revealed that the differential pressure (DP) across the 1A RHR HX (which was the most accurate indicator of degraded HX performance) had steadily increased during the quarterly performance tests by approximately 31 inches of water DP from a low-point in May 2006 of 142 inches DP, until the January 2007 measurement of 173 inches DP (the normal seasonal variance was about 8 inches DP). However, this increase was not considered an adverse trend by the licensee despite being a more than two standard deviation increase. In addition, the licensee made a critical assumption, based on data following a 5-day shutdown period in August 2006 when the 1A RHR HX was used for shutdown cooling, that there was "no apparent accumulation of shells during that period...a good indication that the most significant shell deposition has already taken place." The performance test following within days of that outage period actually showed data to the contrary with a 20 inch increase in DP, when no change in DP was expected for that time of the year. Licensee personnel decided that the 20 inch DP increase in August 2006 (to 162 inches DP), was a "re-baselining" of the DP data and the subsequent increase to 173 inches DP by January 2007 was due to seasonal variance. The inspectors were not provided, nor were they able to determine the technical basis for the licensee's "re-baselining" decision. The inspectors concluded that the more logical reason for increasing RHR HX DP was that shell transport from the CSW header had never actually abated.

Following the operability determination associated with NCR 224737, the 1A RHR HX was declared operable, but degraded with no interim compensatory measures until the CSW header would be cleaned during the Spring 2008 Unit 1 outage.

The next quarterly performance test in April 2007 revealed the highest recorded 1A RHR HX differential pressure of 188 inches DP (a 46 inch increase in DP since May 2006 which represented a statistical change of four standard deviations). The licensee initiated a Priority 3 NCR 232550 Adverse Condition Correct and Trend Form (CAT). The operability determination of this NCR referred to the operability determination from NCR 224737 with no new analysis, no identification of a degrading trend in HX performance, and no new interim compensatory actions. The 1A RHR HX was later

cleaned in May 2007 to remediate the “unexpected” condition of the increased 1A RHR HX DP.

In September 2007, Unit 1 was shutdown for about 11 days, but cleaning the Unit 1 CSW header was not included in the work scope of the outage. The service water to the 1A RHR HX was utilized for 9 days to provide shutdown cooling and cooling for the Reactor Building Component Cooling Water System (RBCCW). However, the 1A RHR HX performance was not monitored. Following this outage in October 2007, the next quarterly performance test for the 1A RHR HX revealed a differential pressure of 200 inches DP. The licensee initiated NCR 249130 to address this increase in DP. The subsequent operability determination for NCR 249130 questioned the validity of previous assumptions regarding the possibility of shell transport and deposition, and now recognized the potential for continued fouling of the 1A RHR HX. The present and future operability of the 1A RHR HX was evaluated as operable, but degraded, based on the licensee’s assumptions of expected shell transport and how fast the HX could potentially foul versus the heat load needs during an accident event. However, this operability evaluation required the licensee to initiate three interim compensatory measures to ensure operability, which included guidance to Operations to - throttle RHRSW flow as soon as feasible following the event; monitor 1A RHR HX performance when the HX is in service via the same DP instrumentation during the HX performance tests; and make the NSW header preferred whenever possible. The licensee planned on completing the long-term corrective action of cleaning the CSW header during their upcoming spring 2008 Unit 1 outage.

Analysis: The inspectors determined that the licensee’s failure to identify the degrading trend in 1A RHR HX performance from August 2006 until October 2007 due to SW fouling, and take prompt and adequate corrective actions, was a performance deficiency. The inspectors determined that the finding is more than minor because if left uncorrected, the issue would become a more significant safety concern in that the potential existed for making the RHR HX inoperable due to tube sheet fouling. In addition, the inspectors also determined that this issue was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the cause of the degrading trend in 1A RHR HX performance was not identified, and the requisite corrective and compensatory actions were not put in place, such that the availability and reliability of the 1A RHR HX was adversely affected. This finding was evaluated using Inspection Manual Chapter 0609, “Significance Determination Process,” Phase I Worksheet for mitigating systems. The finding was determined to be of very low safety significance (Green) because the degraded condition did not actually result in a loss of the Unit 1 RHR system safety function. This finding has a cross-cutting aspect in the area of Problem Identification and Resolution because the licensee did not take appropriate corrective actions to address safety issues and adverse trends in a timely manner, commensurate with their safety significance and complexity, in that the licensee did not promptly address an adverse trend in the 1A RHR HX’s performance. (P.1.(d)).

Enforcement: 10 CFR Part 50, Appendix B, Criterion XVI, Corrective Action, requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to this, the licensee did not identify a degrading trend in 1A RHR HX performance due to SW fouling and take prompt and adequate corrective actions to address the issue. Because this finding was of very low safety significance and has been entered into the licensee's corrective action program as NCR 268318, this violation is being treated as a NCV, consistent with Section VI.A of the NRC Enforcement policy: NCV 05000325/2008006-02, Failure to Adequately Evaluate and Correct a Condition Adverse to Quality Involving Service Water Fouling of the 1A RHR Heat Exchanger.

b. Assessment of the Use of Operating Experience

(1) Inspection Scope

The inspectors examined licensee programs for reviewing industry operating experience, reviewed the licensee's operating experience database, and interviewed the Operating Experience Coordinator, to assess the effectiveness of how external and internal operating experience data was handled at the plant. In addition, the inspectors selected nine operating experience documents (e.g., NRC generic communications, 10 CFR Part 21 reports, licensee event reports, vendor notifications, and Progress Energy plant internal operating experience items, etc.), which had been issued since January 2007, to verify whether the licensee had appropriately evaluated each notification for applicability to the Brunswick plant. Documents reviewed are listed in the Attachment.

(2) Assessment

The team determined that the licensee was effective in screening operating experience for applicability to the plant. The inspectors verified that the licensee had entered those items determined to be applicable into the CAP and taken adequate corrective actions to address the issues. External and internal operating experience was adequately utilized and considered as part of formal root cause evaluations for supporting the development of lessons learned and corrective actions for CAP issues.

(3) Findings

No findings of significance were identified.

c. Assessment of Self-Assessments and Audits

(1) Inspection Scope

The inspectors reviewed department self-assessments, and audits by onsite and offsite groups, to verify that the CAP was appropriately prioritizing and evaluating identified problems in accordance with their risk significance. The inspectors compared the NRC's CAP assessment results against the licensee's assessment of the CAP effectiveness.

(2) Assessment

The team determined that the scope of self-assessments and audits were critical, insightful, and persistent at identifying issues and entering them into the corrective action program. Department self-assessments, and audits by the onsite Nuclear Assessment Section (NAS) and offsite Performance Evaluation Section (PES) audits were typically very thorough and comprehensive. These audits and assessments did identify issues similar to those identified by the NRC, such as untimely and ineffective implementation of corrective actions. Effectiveness reviews for root cause evaluations were usually comprehensive, detailed, and correctly identified significant CAP implementation deficiencies. However, corrective actions developed as a result of these assessments and audits were not always effective (see section below).

(3) Findings

No findings of significance were identified.

d. Closure of IP 95002 Unresolved Item (Part 1 and 2)

In NRC Supplemental Inspection Report (IR) 05000325, 324/2007-010 dated October 11, 2007, the inspectors identified an unresolved item (URI) 05000325, 324/2007010-01, Handling of Diesel Generator Problems by the CAP. This URI was documented in two parts. Part 1 of this URI focused on the inspectors' concerns regarding the licensee's approach and prior opportunities to identify a degrading trend in EDG performance. Part 2 of this URI focused on the inspectors' concerns regarding the licensee's corrective action tracking and implementation.

(1) Inspection Scope - Part 1

The PI&R team inspectors reviewed Supplemental IR 2007-010. In Section 02.01.b(2), of Supplemental IR 2007-010, the IP 95002 team inspectors listed a number of AR/NCRs that had been initiated by the licensee between 2003 and 2006 (i.e., 102339, 129173, 135289, 169120, 206696, and 204325) to address recurring preventive maintenance and human performance issues. Along with these ARs, the IP 95002 team inspectors, also mentioned in IR 2007-010 a self-assessment conducted by the licensee, that subsequently became a benchmarking report, documented by AR/BENC 166409, Comprehensive Assessment of Diesel Generator Health. The specific issues identified by these seven ARs were reviewed by the PI&R team inspectors in light of the impact they had on the continuing problems with the Brunswick EDGs and the licensee's previous opportunities to recognize, investigate, and correct a degraded trend in EDG performance. The PI&R team inspectors also reviewed AR/NCR 243397, EDG Performance Adverse Trend, that was initiated on August 16, 2007 by the licensee to address the IP 95002 team inspectors' concern regarding a lack of an EDG adverse trend investigation. In addition, the PI&R team inspectors reviewed NCR 236415, High Use of CAP L Cause Code, to ascertain the impact indeterminate cause codes had upon the ability of the licensee's CAP to identify degraded EDG performance. Furthermore, the PI&R team inspectors reviewed the licensee's implementation of Priority 1 NCR 243389, Recurring Corrective Action Program Deficiencies, that was initiated in August

16, 2007 to address the broader, persistent CAP ineffectiveness problems identified by various onsite, corporate, and independent oversight organizations (e.g., SEU, NAS, PES).

### Inspection Scope - Part 2

The PI&R team inspectors reviewed Supplemental IR 2007-010. In Section 02.03.a(2), of Supplemental IR 2007-010, the IP 95002 team inspectors reviewed the licensee's common cause analysis (CCA) as documented by AR/NCR 232815, Common Cause Evaluation for White Inputs to AC Power Unavailability. This CCA determined that the principal contributors to degraded EDG performance were work practices, equipment performance, and the high use of L cause codes. The inspectors of IR 2007-010 also referred specifically to several ARs (e.g., 129173, 204325, 230789, 206696, and 236415) initiated by the licensee to address these principal contributors. These and other related ARs were reviewed by the PI&R team inspectors. The PI&R team inspectors also reviewed the licensee's implementation of AR/NCR 243397, EDG Performance Adverse Trend, including its associated tracking matrix. Furthermore, the PI&R team inspectors selected a majority of the corrective actions specified by the aforementioned ARs to verify the licensee was properly tracking, and implementing these corrective actions as part of their CAP.

### (2) Assessment - Part 1

In Section 02.01.b, "Determination of how long the issues existed and prior opportunities for identification," the IP 95002 team inspectors did not identify any significant findings regarding the licensee's assessment of the individual EDG failures. However, the IP 95002 team inspectors were concerned with the licensee's approach for identifying a degraded trend in EDG performance. Even though the licensee had conducted comprehensive and thorough, independent and multi-disciplined investigations of Brunswick EDG reliability as documented by the AR/BENC 166409 benchmark report and AR/NTM 230789, EDG Reliability Improvement Team Report, neither of these investigatory efforts and associated documentation were completely consistent with the guidelines of CAP-NGGC-0200 and CAP-NGGC-0206, CAP Trending and Analysis, for conducting an adverse trend investigation. After further review and discussions with the IP 95002 team inspectors, the licensee acknowledged this deficiency and initiated an adverse condition (Priority 2) AR/NCR 243397 to address the failure of the CAP to initiate an adverse trend NCR when it was initially recognized by AR 166409 in August 2005. Although, NCR 243397 did not actually conduct a priority 1 adverse trend investigation, it did assess and determine certain elements were potentially missing from the previous ARs that were deemed important for ensuring a complete adverse trend investigation of EDG degraded performance. The most significant of these missing elements were a common cause analysis, an investigation into overall CAP deficiencies, and a single NCR for tracking all the corrective actions associated with EDG reliability improvement.

In NCR 234997, the licensee addressed how each of the missing aspects mentioned above were dispositioned. First, there were two CCA's conducted by the licensee to investigate adverse trends in EDG performance. One CCA was accomplished by the licensee in preparation for the IP 95001 supplemental inspection as documented by

AR/NCR 200750, Common Cause Analysis for EDG MSPI White Status (June 2006). The other CCA was completed in preparation for the IP 95002 supplemental inspection as documented by AR/NCR 232815, Common Cause Evaluation for White Inputs to AC Power Unavailability. Both of these CCA's were conducted according to the CAP-NGGC-0200 guidance for a trend investigation report, and were reviewed during NRC supplemental inspections (i.e., IR 2006-008 dated April 13, 2007, and IR 2007-010). Secondly, NCR 234997 refers to AR/NCR 243389 as a priority 1 investigation initiated by the licensee to address overall deficiencies with the CAP (see below). And thirdly, NCR 234997 verified the disparate corrective actions of the numerous ARs were captured and provided a road map for tracking the Top 16 EDG Reliability Issues (see below, Assessment - Part 2).

The IP 95002 team inspectors also determined that weaknesses in the CAP resulted in missed opportunities to correct preventive maintenance and human performance issues that affected availability and reliability of the EDGs. Similar weaknesses and the inadequacy of the CAP to effectively correct them, was previously identified on several occasions by onsite and corporate oversight organizations that resulted in additional ARs. Although numerous ARs were written between 2003 and 2007 to address the recurring preventive maintenance, human performance, and CAP ineffectiveness issues, the IP 95002 team inspectors concluded that there was no specific evaluation(s) or corrective action(s) by the licensee to address the failure of the CAP to effectively deal with these deficiencies and their impact on persistent problems with EDG performance. After reviewing all associated ARs, the PI&R team also concluded that at the time of the IP 95002 inspection, the licensee did not adequately evaluate or establish corrective actions to specifically address the failure of the CAP program to identify an adverse trend with EDG reliability and performance consistent with their CAP guidance. To address these previously known weaknesses with the CAP, and failure of the CAP to correct them, the licensee subsequently initiated significant adverse condition (Priority 1) NCR 243389, Recurring Corrective Action Program Deficiencies. However, NCR 243389 did not specifically mention or address the failure of the CAP to recognize and correct the continuing problems with EDG performance.

The PI&R team reviewed NCR 243389 in detail, including the results of the root cause investigation and all associated corrective actions. The licensee conducted a comprehensive, in-depth re-evaluation of their ineffective corrective actions to address repetitive CAP implementation weakness, deficiencies, and adverse trends identified by various oversight organizations both inside and outside of the Brunswick station (e.g., NAS, PES, Self-Evaluation Unit (SEU)). The results and conclusions from this evaluation were self-critical and focused into specific causal areas. The two principal root causes were attributed to a lack of site leadership and support of the CAP, and poor implementation of corrective action plans to improve CAP performance. Several corrective actions to prevent recurrence (CAPR) and multiple CORR's were identified by NCR 243389 to address these root causes and applicable contributing factors. The breadth and nature of these corrective actions appeared to be capable of instituting significant CAP improvements. Furthermore, these corrective actions were adequately captured and tracked in a highly visible way, and were already evidencing some noticeable improvement in the execution and products of the CAP.

An important element of the NCR 243389 investigation was the licensee's safety culture evaluation in accordance with CAP-NGGC-0205, Significant Adverse Condition Investigation. Thirteen critical safety culture attributes were evaluated for their contribution to the persistent CAP weaknesses, deficiencies, and adverse trends identified by NAS, PES, SEU and an independent offsite oversight organization from 2005 through 2007. Of these thirteen attributes, seven were considered to be applicable, such as: 1) Resources, due to lack of committed personnel to perform quality root cause investigations; 2) Work Practices, due to inadequate leadership and support of CAP implementation; 3) Corrective Action Program, due to inadequate implementation of corrective actions; and, 4) Self and Independent Assessments, due to failing to correct cited problems. Corrective actions to address these attributes were included as part NCR 243389. The applicable safety culture attributes identified by the licensee were consistent with the CAP weaknesses discussed by the IP 95002 team in their report.

In NCR 232815, Common Cause Evaluation for White Inputs to AC Power Unavailability, and NCR 236415, Site High Use of CAP L Cause Code, the licensee identified the high use of L cause codes (i.e., cause not applicable, or indeterminate) as a potential significant contributor to the failure of the CAP to identify an adverse trend in EDG performance. The PI&R team inspectors reviewed the consequences of the licensee's use L codes to ascertain the impact indeterminate cause codes had upon the ability of the licensee's CAP to identify degraded EDG performance. Of the approximately 59 cause codes for the approximately 14 EDG-related Priority 1 NCRs initiated between 2003 - 2007, only nine (or 15% of 59) used the L cause code. Of the approximately 201 Priority 2 EDG-related AR/NCRs initiated between 2003 - 2007, about 44 (or 22% of 201) used the L cause code. However, subsequent investigation by the licensee concluded the Priority 1 and 2 AR/NCRs with an L cause code did not represent or hide an unrecognized adverse trend. Furthermore, the consequences of using L cause codes did not warrant any additional corrective actions or further NCR investigations. Based on these results, the PI&R team concluded that the high use of L codes was not a significant contributor to the failure of the CAP to recognize and correct the adverse trend of EDG performance in a timely manner.

In summary, the licensee failed to initiate an adverse trend investigation AR when it was initially recognized by AR 166409 in August 2005. However, licensee actions prior to and since the IP 95002 team inspection have essentially accomplished all of the important aspects of an adverse trend investigation. In addition, prior to the IP 95002 team inspection, the licensee did not adequately evaluate or establish corrective actions to specifically address the failure of the CAP program to identify an adverse trend with EDG reliability and performance. However, even though the subsequent initiation of NCR 243389 did not specifically address the failure of the CAP to recognize and correct chronic problems with EDG performance, the breadth and depth of the root cause investigation and corrective actions appeared to encompass the CAP weaknesses described by the IP 95002 team. Lastly, the high use of L codes was not a significant contributor to the failure of the CAP to recognize and correct the adverse trend of EDG performance in a timely manner. The much more likely significant contributors to the licensee's failure to recognize and address degraded EDG performance in a more timely manner were the applicable safety culture attributes identified by NCR 243389.

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## Assessment - Part 2

Over the past five years, the licensee has initiated many ARs with numerous corrective actions to address persistent EDG performance problems. Although, the licensee did not identify a common cause in either of the CCA's they conducted in preparation for the IP 95001 and 95002 supplemental inspections, they did identify in NCR 232815 certain significant contributors to poor EDG performance associated with work practices, equipment performance, and the high use of L codes. To address the impact of maintenance work practices on EDG performance, the licensee relied upon the corrective actions established by NCR 129173, Maintenance Adverse Trend in Human Performance, and NCR 204325, NAS Asm't B-MA-06-01-I1, Conduct of Maintenance. [Note, the licensee did identify other adverse human performance trends related to Operations (NCR 228956), and of a Site-Wide (NCR 227583) and Fleet-wide (NCR 234828) nature, but the PI&R team chose to focus on the predominant work practice contributor associated with Maintenance.] To address the impact of equipment performance on EDG performance, the licensee relied upon the corrective actions established by NCR 206696, Gap in Preventive Maintenance - 2006, AR/NTM 230789, EDG Reliability Improvement Team Report, and more recently NCR 243397, EDG Performance Adverse Trend. To address the high use of L codes as a potential contributor to EDG performance, the licensee relied upon NCR 236415, Site High Use of CAP L Cause Codes. The PI&R team selected a large number of corrective actions from the aforementioned ARs to verify whether these corrective actions were properly captured, tracked, and being implemented. [Note, the PI&R team did not consider the high use of L cause codes as a significant contributor to degraded EDG performance (see Assessment - Part 1, above) and as such the corrective actions of NCR 236415 were not specifically verified.]

With regard to equipment performance, the licensee conducted a comprehensive, multi-disciplined review in February 2007 (NTM 230789) of the Brunswick operating and maintenance history over the previous several years to identify both short term and long term corrective actions for improving EDG performance. This EDG reliability review included recent and past NCRs (approximately 278), work orders, self-assessment reports, NRC findings, industry OE, etc. The results of this review were documented in an EDG Reliability Improvement Report that analyzed, captured and categorized all significant corrective actions into sixteen specific areas (also known as the Top 16 Reliability Issues). Subsequently, the licensee completed another review in November 2007 of all corrective actions associated with the Top 16 Reliability Issues of the EDG Reliability Improvement Report (NTN 230789), and all the remaining open actions from the AR/BENC 166409, EDG Benchmark Report. All of these actions were then consolidated (where practical) under NCR 243397, which also included a tracking matrix to facilitate future reference and management. Furthermore, in December 2007, an independent EDG assist visit was conducted that verified the licensee's corrective actions associated with the Top 16 issues as documented in their reliability report. The PI&R team concluded that the licensee was properly tracking all the significant corrective actions associated with improved EDG reliability from an equipment performance perspective. In addition, the PI&R team determined that the licensee had developed plans, priorities and schedules (some which extend into the year 2012) to implement these actions, and appeared to be accomplishing them in a reasonably practicable

manner.

With regard to maintenance work practices, the licensee's ability to properly track and implement established corrective actions exhibited mixed results. In 2004, NCR 129173 (Priority 1) was initiated to address an adverse human performance trend in Maintenance. In August 2006, another (Priority 1) NCR 204325 was initiated to address an NAS Issue (B-MA-06-01-11) for inadequate conduct of maintenance, including ineffective corrective actions to address NCR 129173. Then, in August 2007, (Priority 1) NCR 243846, CAPR Not Fully Implemented for NCR 204325, was initiated to address an NAS finding that one of the CAPRs established by NCR 204325 had not been fully implemented even though it was closed out as completed. Finally, on November 29, 2007, (Priority 2) NCR 257100, Corrective Actions Not Effective, was initiated because the licensee's Effectiveness Review of NCR 204325 concluded that the established CAPRs were not fully effective in achieving the desired level of improvement in overall conduct of maintenance. This review determined that the intended CAPRs were improperly implemented, and that this was not recognized by the Maintenance management team. The apparent cause was attributed to inadequate self-evaluation methods within the Maintenance organization. Numerous additional corrective actions were developed from the NCR 204325 Effectiveness Review that were subsequently incorporated into NCR 204325 to correct the original condition. In addition, NCR 257100 established a Maintenance Corrective Action Review Board (M-CARB) to provide effective oversight, awareness, and understanding of corrective action plans for significant Maintenance related deficiencies. Furthermore, the PI&R team determined that the Maintenance organization had instituted several other methods to monitor the conduct of maintenance, and provide for periodic reviews by Maintenance management of organizational effectiveness. These other methods included - 1) Focused or targeted observations by Maintenance management and supervision; 2) Self-evaluation rollout meetings; 3) Live time trending of observations and NCRs; 4) Monthly Maintenance management review meetings; and 5) Maintenance organization Performance Indicators. However, unlike the new or improved standards for conduct of maintenance to be incorporated into OMMM-001, Maintenance: Conduct of Operations, not all of these other methods were specifically described by the procedure.

In summary, the numerous corrective actions identified by the licensee's investigations and adverse trend NCRs regarding EDG equipment reliability issues appeared to be adequately captured, tracked, scheduled, and implemented, so far to date. The corrective actions associated with maintenance work practices appeared to be adequately captured, tracked, and scheduled. However, PI&R team was unable to conclusively determine the acceptability of the licensee's corrective action implementation to address maintenance work practices. This uncertainty in the licensee's ability to successfully implement the necessary corrective actions to improve the conduct of maintenance work practices was based on the repetitive history of ineffective corrective action implementation, the lack of sufficient time to assess the effectiveness of the recent round of corrective actions, and inadequate definitive evidence and/or indicators of improved Maintenance performance (e.g., sharp reduction in clock resets). Although the Maintenance Human Performance Index appears to indicate an improving trend for 2005 – 2007, the number of Maintenance human performance Clock Resets for 2008 were running well ahead of the adverse trend

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exhibited in 2006. There were 11 clock resets in 2006, whereas in the first two months of 2008 there are already seven. However, the PI&R team does recognize that this increase in clock resets may be more indicative of the Maintenance organizations reduced threshold and attempts to focus on less significant events to stimulate improved performance. In addition, none of the Maintenance Clock Resets since July 2007 have been indicative of work practice issues that could have adversely affected EDG performance.

(3) Findings

No findings of significance were identified. Both Part 1 and 2 of URI 05000325, 324/2007010-01 are considered closed.

e. Assessment of Safety-Conscious Work Environment

(1) Inspection Scope

During normal interactions with plant employees during the course of this inspection, the inspectors informally interviewed plant personnel about the safety-conscious work environment (SCWE) at the site. In addition, the inspectors formally interviewed 42 working-level plant employees in ten group interviews of four or five persons, and ten first-line supervisors in two group interviews to gather their perspectives on the SCWE at Brunswick. The inspectors also selected and reviewed employee concerns that appeared to be related to SCWE, and interviewed the employee concerns representative to verify that these concerns had been reviewed and processed in accordance with procedure REG-NGGC-0001, Employee Concerns Program. Furthermore, the inspectors compared and contrasted the information gathered, evaluated, and reported in the most recent licensee self-assessment of the site's safety culture, as documented in PES Report 06-12-SP-B, "BNP Nuclear Safety Culture Assessment."

(2) Assessment

The inspectors found that licensee personnel were willing to identify safety issues, and that most were confident that identified issues would be properly addressed and resolved. However, information gathered during this inspection included the following observations that some plant employees may be more reluctant to report such issues than others:

- Most plant employees interviewed stated their work groups were understaffed. Consequently, they had been working relatively high amounts of overtime. A general understanding in the industry is that inadequate staffing which results in excessive overtime is an underlying factor that could produce a reluctance to report safety issues.
- Some plant employees interviewed said they had received direction that before they initiate an NCR, they must first find someone who will agree to own that NCR. This non-proceduralized practice could represent a challenge to the free flow of information because it is a barrier that plant employees must overcome to initiate an

NCR. This practice was potentially an underlying factor that could tend to discourage plant employees from reporting safety issues.

- More than one plant employee told the inspectors that after they had initiated an NCR, that highlighted an adverse condition related to some work group's responsibilities, one or more members of the affected work group had provided negative feedback to the initiators. Events like this had apparently influenced some plant employees to consider NCRs as punitive. This perspective, coupled with the natural desire to avoid negative feedback and to not punish fellow workers, could tend to discourage plant employees from initiating NCRs.
- Some plant employees interviewed indicated they had lost faith in the ability of the CAP to resolve issues because they had seen several identified issues that were either not addressed, or not addressed as quickly, as the initiators deemed appropriate. (Examples of unaddressed issues that were provided by the plant employees were not nuclear-safety-related.) The inspectors considered cases where personnel believe that identifying issues does not result in adequate corrective action, could result in reluctance by these individuals to identify additional issues.
- For at least the past three years (2005 - 2007), a large percentage of employee concerns have been submitted anonymously. In particular, 28 of 47 employee concerns in 2007 were anonymous. This high percentage of anonymous employee concerns could be indicative of work environmental conditions that contribute to a reluctance of employees to raise safety concerns. The licensee stated that an AR was previously initiated at Robinson to address this issue across the fleet.

A comparison of the inspectors' results with those reported by the licensee in a safety culture assessment (PES report 06-12-SP-B), revealed that the licensee had identified weaknesses similar to two of the observations described above. More specifically, the licensee had identified that some plant activities had been challenged by personnel vacancies, and that some personnel considered the CAP to be a burden and were skeptical of the ability of the CAP to resolve some long-standing equipment problems. However, the licensee's assessment did not describe as either an issue or weakness the non-proceduralized practice mentioned above that was a challenge to the free flow of information; occurrences of intra-group negative feedback at the working level; and SCWE-related concerns documented in the employee concerns program.

### (3) Findings

No findings of significance were identified.

#### 4OA6 Meetings, Including Exit

##### Exit Meeting Summary

On February 29 and April 7, 2008, the inspectors presented the inspection results to Mr. B. Waldrep and other members of his staff. The inspectors confirmed that proprietary information was not retained following the inspection.

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#### 4OA7 Licensee Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which met the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for disposition as a NCV.

Technical Specification (TS) 5.4.1 requires the licensee to implement procedures recommended by Regulatory Guide 1.33, Appendix A, November 1972, which includes procedures for Power Operation and Process Surveillance. Reactor Engineering Guidelines Procedure (OENP-24.0) requires that a Reactivity Control Plan (RCP) shall be developed for all preplanned power maneuvers. The licensee's computer program generated a predict case that determined which control rods should have been moved to acquire the desired power maneuver. Step 12 in Attachment 2 of OENP - 24.0 required a comparison between the generated predict case and the information that would be transcribed onto the control rod movement form which would be used by the reactor operators to move the selected control rods. Contrary to the above, during power ascension on December 9, 2008, the on-duty Reactor Engineer transcribed four incorrect control rods onto the control rod movement sheet, which resulted in the incorrect control rods being withdrawn and a deviation to the RCP. Subsequent to moving three of the four control rods, the Reactor Engineer realized the error and informed the Senior Reactor Operator, who stopped control rod movement. This finding is of very low safety significance because core parameters (e.g., thermal limits) were maintained within specifications. This violation was entered into the licensee's corrective action program as NCR 258349 "Inadvertent Withdrawal of Multiple Control Rods."

ATTACHMENT: SUPPLEMENTAL INFORMATION

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## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee Personnel

G. Atkinson, Supervisor - Emergency Preparedness  
R. Bissett, Superintendent - Maintenance Support  
A. Brittain, Manager - Security  
M. Dorsey, Employee Concerns  
G. Galloway, Acting Manager - NAS  
H. Harrell, Engineering Supervisor - Balance of Plant  
C. Howard, Preventive Maintenance Coordinator  
S. Howard, Manager - Operations  
R. Ivey, Manager - Nuclear Support Services  
F. Jefferson, Superintendent - Technical Services  
B. McCabe, Manager - Regulatory Affairs  
A. Pope, Supervisor - Licensing/Regulatory Programs  
S. Rogers, Manager - Maintenance  
T. Sherrill, Licensing Engineer  
N. Smith, Engineering Supervisor - Electrical Systems  
M. Verrilli, Acting Superintendent - Document Services and Self-Evaluation  
E. Wills, Plant General Manager  
B. Waldrep, Site Vice President

#### NRC Personnel

Randall A. Musser, Chief, Reactor Projects Branch 4, Division of Reactor Projects, Region II  
Joseph W. Shea, Director, Division of Reactor Projects, Region II

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened and Closed

- |                          |     |   |
|--------------------------|-----|---|
| 05000325, 324/2008006-01 | NCV | Failure to Correct a Condition Adverse to Quality Involving an MSIV Design Deficiency (Section 4OA2.a.(3)(i))   |
| 05000325/2008006-02      | NCV | Failure to Adequately Evaluate and Correct a Condition Adverse to Quality Involving Service Water Fouling of the 1A RHR Heat Exchanger (Section 4OA2.a.(3)(ii)) |

### Closed

- |                          |     |  |
|--------------------------|-----|--|
| 05000325, 324/2007010-01 | URI | Handling of Diesel Generator Problems by CAP (Part 1) (Section 4OA2.d) |
| 05000325, 324/2007010-01 | URI | Handling of Diesel Generator Problems by CAP (Part 2) (Section 4OA2.d) |

## LIST OF DOCUMENTS REVIEWED

### Section 4OA2: Identification and Resolution of Problems

#### Procedures

- CAP-NGGC-0200, Corrective Action Program, Rev.19
- CAP-NGGC-0201, Self Assessment and Benchmark Programs, Rev. 10
- CAP-NGGC-0202, Operating Experience Program, Rev. 10 and 12
- CAP-NGGC-0204, Human Performance Program, Rev. 0
- CAP-NGGC-0205, Significant Adverse Condition Investigations, Rev. 5
- CAP-NGGC-0206, Corrective Action Program Trending and Analysis, Rev. 1
- REG-NGGC-001, Employee Concerns Program, Rev. 13
- 0AI-09, Plant Nuclear Safety Committee Administration
- 0CM-VBF500, Corrective Maintenance Procedure - Fisher Butterfly Valves Series 9100
- 0PM-STR500, Preventive Maintenance Procedure - R. P. Adams Self-Cleaning Strainers, Models VWS 10 Through 40 Revision 15
- 0PT-07.2.4A, Core Spray System Operability Test - Loop A
- 1PM-MEC502, Preventive Maintenance - Unit 1 Conventional Service Water Header Inspection Revision 3
- 1PM-MEC506, Preventive Maintenance - Unit 1 Nuclear Service Water Header Inspection Revision 3

2PM-MEC501, Preventive Maintenance - Unit 2 Nuclear Service Water Header Inspection  
 Revision 6  
 2PM-MEC505, Preventive Maintenance - Unit 2 Conventional Service Water Header Inspection  
 Revision 1  
 ADM-NGGC-0104, Work Management Process  
 0AI-122, Pre-Job Briefings & Post Job Critiques  
 0AP-025, BNP Integrated Scheduling  
 0OI-01.01, Operations Unit Organization and Administration  
 0MMM-058, Work Package Planning  
 OPS-NGGC-1307, Operational Decision making  
 OPS-NGGC-1305, Operability Determinations  
 0AP-054, Plant Leak Management, revision 4  
 0PM-MO504, Mechanical Inspection and Lubrication of Limitorque Operators  
 0MMM-022, Instructions for Placement of Temporary Loads (e.g., Ladders and Personnel)  
 0MMM-001, Maintenance: Conduct of Operations, Revision 50 and Draft Revision 51  
 AI-148, Self-Evaluation Program  
 0ENP-24.0, Reactor Engineering Guidelines, Rev. 40  
 0OI-01.06, Post Scram Review, Rev. 26  
 1/2OP-02, Reactor Recirculation System Operating Procedure

#### Action Requests and Nuclear Condition Reports

083719, New fuel bundles put into incorrect locations in the SFP  
 102339, WANO Peer Review Shortfalls in Preventive Maintenance  
 121633, Fuel bundle remained attached to main hoist without fuel bridge crew's knowledge  
 129173, Maintenance Adverse Trend in Human Performance  
 135289, PES Issue for Plant Performance  
 148691, Implementation of roof repairs for the 1A RHR HX room roof leak  
 155034, Body-to-bonnet valve leakage of the 2A RHR HX steam condensing mode relief valve  
 (2-F055A)  
 156640, Fuel sipping results in fuel bundle being rotated 90 degrees  
 166409, EDG Benchmark Report  
 169120, NAS Weakness in Equipment Reliability Process  
 183102, Failure to adequately investigate and determine the cause of a containment isolation  
 valve stroke test failure  
 185508, LLRT Instrumentation  
 186694, LLRT Failure of 1-B21-F032A  
 186698, LLRT Failure of 1-E41-F003  
 186758, Core Spray Nozzle Indication (IVVI)  
 186771, 1-B21-F028A LLRT Failure  
 187321, 1-B21-F010B Failed LLRT  
 187513, Unit 1 Core Spray Sparger Tee Box Apparent Crack Growth  
 187867, New Cracking Identified On Core Spray Header Piping  
 188134, Loss of SSFPC Cooling Fans  
 188541, 0Pt-07.1.1A/B Acceptance Criteria Nonconservatism  
 190946, CS 1B Line Break Instrument Reading Outside Of 0OI-3.3 Limit  
 200612, Revision to Tech Spec SR 3.6.1.6.2  
 201240, 2C CSW Pump Failure

204325, NAS Asm't B-MA-06-01-11, Conduct of Maintenance  
206696, Gap in Preventive Maintenance - 2006  
211212, U2 SAT X- Winding Non-Segregated Bus Fault  
211236, Ops Prohibited by Tech Specs Due to Inoperable EDG 1  
212509, Unit 2 Manual Scram Due to Conductivity Increase  
214841, Service Water Pump Discharge Pressure Gages Not Calibrated  
215809, Inadvertent Control Rod insertion due to Human Performance Error  
215809, Inadvertent Control Rod insertion due to Human Performance Error  
217345, Failure to Incorporate OE into Plant Procedures  
217345, Automatic Reactor Scram due to Neutron Monitoring System  
218349, 2RB-17 SRHR Clean Area Floor Contaminated  
218352, Request For Off-Site Medical Services  
219124, Site Alignment Meeting Effectiveness  
219125, Plant Monitoring and Oversight of Activities  
219127, Unawareness of Longstanding Problems  
219129, CAP Perceived as Burden and Hindrance  
219130, External Insights not Values By Site  
219728, 1-E21-FT-N003B Found Out Of Calibration.  
220440, Firearms Qualification  
220519, E1 to E3 Cross-tie breaker unavailable due to misalignment  
221013, Weapons Malfunction  
221310, Process Weakness In Maintaining The EDB RRIL  
223875, Adverse Trend in Cold Critical Data Accuracy  
224481, LLRT Failure of 2-B21-F028A  
224737, Shells found in stagnant CSW 24 inch header during outage inspection  
224737, Shells found in stagnant CSW 24 inch header during outage inspection  
224833, Process Weakness In Maintaining The EDB RRIL  
225872, Unit 1 HPCI/RCIC CST level switch repeatability was inconsistent  
226443, Bulging of the Drywell Personal Penetration Sleeve  
226451, Incorrect fuel assembly moved from the SFP to the core  
227126, LLRT Failure of 2-B21-F032B  
227162, Clean Area Floor Lost Due To Cont. Water  
227261, Unit 2 control rod withdrawal without an operable source range monitor  
227261, Unit 2 control rod withdrawal without an operable source range monitor  
227656, 2B RHR pump flange leakage  
227797, Radiological Air Sampling Enhancements  
227854, TS Required Shutdown Due To EDG #4 Operability  
228697, Technical Error Found in Reactivity Control Plan  
229206, Performance Deficiencies in Radiological Jobs  
229208, Deficiencies in Radworker Performance  
229641, Unit 2 CST level switch failure due to substandard materials  
229976, U2 'A' Loop Core Spray Pressurizing  
230139, RCIC Turbine Trip  
230789, EDG Reliability Improvement Team Report  
232045, Safety Relief Valve (SRV) back-up nitrogen design flow rate discrepancy with test procedure  
232267, Deficiencies in Resin Transfer To The RPA  
232492, Material Not Meeting Design Requirements

232550, 1A RHR HX performance test had unexpected DP increase to 188 inches  
232815, Common Cause Evaluation for White Inputs to AC Power Unavailability.  
232959, Firearms Qualification  
233948, 1A RHR HX cleaning incorrectly entered into EOOS  
234133, Containment Found in Clean Area  
234914, ERO team failed to sound siren and perform accountability for an SAE in time  
235336, Failure to restore TSC/EOF HEPA system following a drill  
236415, Site High Use of CAP L Cause Codes  
237957, Unit 1 Condensate Storage Tank limit switches removed from service without a risk assessment  
238528, Pipe union water leak during installation of new Unit 1 CST level switches  
238802, NAS EP assessment corrective actions  
239752, Extend Due Date On PM For 2-E21-F015A  
240192, Goal Setting and Monitoring Not Performed for an EDG  
240776, SA 216945, D1, Workers No Longer In Critical Group  
240978, OCR For 2A, 2B, 1B RHRSW Loops  
241694, OE Items In Check Valve Program That Need Eval (NAS ID'D)  
241773, Adverse Trend in Corrective action Effectiveness  
243389, Recurring Corrective Action Program Deficiencies  
243397, EDG Performance Adverse Trend  
243465, FME Found In 1B RHR Room Cooler Inlet Piping  
243589, DG4 reverse power trip due to operator error  
243846, CAPR Not Fully Implemented for NCR 204325  
243857, Resin Processing Area Doesn't Meet Standard  
244980, Reactivity Management and Use of Reactor Engineering  
247311, 1C CSW Pump Strainer Broken Tie Rod  
247911, Repeat MRFFs of Drywell Hi Range Rad Monitor  
248630, NAS ASM'T B-SC-07-01-W1, Hand Search  
248631, NAS ASM'T B-SC-07-01-W2, PNSC Review  
248632, NAS ASM'T B-SC-07-01-IMC-1, MGT Observations  
249130, 1A RHR HX performance test as found DP at 200 inches  
249446, Plant Observation Program Improvement Opportunities  
250203, HPCI Inoperable Due To Pump Seal Leakage - MR A(1)  
250420, SCBA Respirator Seal Deterioration  
251381, Depth And Rigor Of Engineering Analysis And OCRS  
252006, Failure of TSC/EOF ventilation system air compressor  
252517, FME Found In The 2B TCC HX  
253059, Incorrect Rev. of OPEP-03.7.6 Found in Emergency Kit  
253663, Unit 1 Condensate Storage Tank HPCI level switches found outside TS required values  
255948, ALARA  
257100, Corrective Actions Not Effective  
257721, Unit 1 Condensate Storage Tank instrument vent lines re-sloping rework  
257870, CAP Health KPI Red for Nov 2007  
258349, Control Rod Withdrawal Errors  
259620, Inadequate Implementation of CA# 6 of NCR 243389  
262396, 2A Core Spray Pump Seal Leak  
262519, Lack of Timely Corrective Action for PES Issue 06-08-SW-I2  
262942, 1D Service Air Compressor Failed to Start

Operating Experience

258380, OE25918 Flexitallic Gasket  
 254265, SONGS NRC Finding Lack of Ops Knowledge  
 241609, OE25246 EDG Has 300KW Oscillations  
 242330, Ensure DG PM Adequacy  
 217918, Documents NCR 223270 Generated  
 243083, NRC IN-2007-26 Epoxy Coating Combustibility  
 252166, NRC IN 2007-34 OE regarding Electrical Circuit Breakers  
 256838, Emergency Diesel Generator Voltage Regulator Problems  
 241898, NAS Assessment, Deficiencies in CAP OE

Maintenance Work Orders/Work Requests

984843, Calibrate U-1 Nuc & Conv SW Disch Press Gauges  
 1049163, 04 - 2-E51-Psl-N006: Install Snubber, Concurrent Temp Mod EC 66766  
 1073548, 2-E21-F028A, Leaking By Keepfill STN (E21-Pcv-F026A) BYPS Valve  
 1095576, B Loop RHRSW Booster Pumps Tripped  
 1098432, 2-SW-V105 - Contingency Inspect Taper  
 1098455, 1-SW-V100, Need To Stake The Taper Pins  
 1098456, Need To Seal Weld Taper Pins On 1-SW-V101  
 1098462, Need To Seal Weld Taper Pins On 2-SW-V101  
 1098469, 1-SW-V4, Seal Weld / Stake The Taper Pins  
 1109066, 1-VA-1A-BFV-RB: Stake Or Weld Taper Pins  
 323030, Cleaning of RHR HX piping under the steam condensing mode relief valves  
 323036, Cleaning of RHR HX piping under the steam condensing mode relief valves  
 323043, Cleaning of RHR HX piping under the steam condensing mode relief valves  
 323046, Cleaning of RHR HX piping under the steam condensing mode relief valves  
 120503, Repair of 1A RHR HX room roof leak  
 1037191, 2B RHR pump flange leakage  
 323052, 1B RHR pump motor heater wiring scorched and discolored  
 322578, Sticky latch mechanism on Unit 2 north HPCI door

Self- Assessments and Audits

217859, Radiation Worker Awareness  
 217627, Environmental Radiation Monitoring Program  
 215553, Radiation Protection Training  
 217624, Corrective Action Program  
 217851, Online Dose Reduction  
 217652, Operating Experience Program  
 NAS B-SC-07-01, BNP Nuclear Security Assessment, October 26, 2007  
 B-EP-07-01, BNP Emergency Preparedness Assessment  
 B-SE-06-01, Self-Evaluation/SOER Assessment  
 BNAS 06-002, Focused Review of the Corrective Action Program  
 PES 06-12-SP-B, BNP Nuclear Safety Culture Assessment  
 NAS B-EC-07-01, Environmental and Chemistry Assessment

Other Documents

MSIV Failure History By Line, 1987-2007  
 BWRVIP-18-A, BWR Vessel And Internals Project Boiling Water Reactor Core Spray Internals Inspection And Flaw Evaluation Guidelines  
 BWRVIP-94 Revision 1, BWR Vessel And Internals Project Program Implementation Guide  
 BNP Piping Specification 248-117 Class 157  
 EC 63657, Repair Of RPV Internal Core Spray Piping Adjacent To Nozzle N5B"  
 EC 67930, Revise EDB Passport Per A/R 240978-31  
 VTM FP-6950, Fisher - Valves, Butterfly And Actuators  
 PMR 218503, Reactivate PM Routes To Calibrate Selected SW Pressure Gages  
 PMR 249496, Revise PMRS For SW Pump Strainers  
 Human performance "news flash" dated 15 Dec 06, regarding inadvertent control rod insertion  
 Emergent Issues List  
 Station Misposition Event and Status Control tracking charts  
 "Root cause investigator" training completion data as pulled from the Progress Energy  
 "Personnel Qualification Data"  
 RHR system health report  
 Reactor Building Residual Heat Removal System drawing nos.: D-25026 (sht 2B), D-25026 (sht 2A), D-25025 (sht 1B), and D-25025 (sht 1A)  
 Residual Heat Removal System Description, SD-17, revision 10  
 Residual Heat Removal System Design Basis Document, DBD-17, revision 14  
 Progress Energy communication record, tracking # 62  
 Unit Residual Heat Removal System drawing nos.: 1-FP-60119, 1-FP-60101, 1-FP-60096  
 Operations log entries on 3/13/2007 and 3/29/2007  
 TS 5.5.2  
 GE qualification report NEDC-31294 in QDP-25, applicable to RHR and Core Spray pump motors  
 BNP Unit 2 Operator Log noting the log entry for the found unlatched HPCI door  
 1A, 1B, 2A, and 2B RHR HX DP trend charts  
 OPT-08.1.4a, rev 68, sect. 6.0, acceptance criteria and Attachment 5 RHR heat exchanger A data sheet  
 Standing Instructions 08-004 and 07-092 regarding interim compensatory measures for 1A RHR HX  
 Control Operator Daily Surveillance Report, rev 93, Attachment 1, copied logs taken during the September 2007 forced shutdown for SW issues  
 Standing Instructions 08-002 and 07-109 regarding interim compensatory measures for all control rod movements  
 Progress Energy memo from Site VP dated January 19, 2008 regarding CAP Performance  
 Nuclear Generation Group Calculation 0B21-1015, BNP Power/Flow Maps  
 Nuclear Generation Group Calculation 2B21-1267, B2C18 Core Operating Limits Report  
 Supplemental Spent Fuel Pool Cooling System drawings 1- FP-85300 and 2- FP-85300  
 Supplemental Spent Fuel Pool Cooling System Health Report

Employee Concern Reports (Titles are redacted for confidentiality)

43167  
 43097

42984  
43169  
43170  
43250

Inspector Identified AR/NCRs Initiated by Licensee During Inspection

NCR 268188, AST Leaks not Properly Identified or Tracked as Per OAP-54  
 NRC 268213, AR 238528 Did not Address Vendor Quality Issue  
 NCR 267933, Determine Maintenance Rule Applicability To SAMG-Diesels  
 NCR 267783, Extent of Condition not Evaluated During Previous Investigation o RHR Pumps  
 NCR 267784, Extent of Condition Not Adequate Evaluated as part of 1A RHR HX Roof Repair  
 NCR 267781, Inadequate Investigation to Address FME Found in 2B TBCCW HX  
 NCR 267739, CAPR Assignment Closure For EP  
 NCR 267744, PI&R Concern of MSIV Maintenance and Testing Activities  
 NCR 267562, SPTMS Surveillance  
 NCR 267543, Corrective Action Clarification for Continuous Feedback and Monthly Critique  
 NCR 267540, PMT Requirements for D Service Air Compressors  
 NCR 267215, Ineffective Corrective Action for RRIL NCR 221310  
 NCR 267318, Evaluate Reliability of MSIVS Based on Past LLRT History  
 NCR 267357, Review MSIV MR Performance Criteria  
 NCR 267271, Issues with NCR 215809  
 NCR 266345, MR Criteria not Revised When MSIV Leakage Limit Increased  
 NCR 266298, Unit 2 North HPCI Room Door Found Not Latched  
 NCR 266585, Inadequate Admin Processing for PRI-2 Increased Rigor NCRS  
 NCR 266483, Housekeeping Not Meeting Site Standards (from RHR system walkdown)  
 NTM 268063, Establish Recurring "What Is Good CAP" Training  
 NCR 268318, Failure to identify 1A RHR HX performance degradation following NCR 232550  
 NCR 268319, Failure to identify 1A RHR HX performance degradation following NCR 232551  
 NCR 273987, Numerous Equipment Problems Identified By The NRC  
 NCR 274013, Inadequate Corrective Actions To Address Recurring Event

List of Work Requests Initiated by Licensee During Inspection

Work request 323052 was initiated to evaluate discoloration on the wire shield on 18 RHR pump motor.  
 Work request 322740 was initiated to repair drain flange on 2-E11-F002A.  
 Work requests 323030, 323036, 323043, and 323046 were initiated to clean piping which had evidence of past leakage from 1(2)-F055A(B).  
 Work request 323173 2-E11-F104A-MO motor operator leaking oil-rebuild actuator.  
 Work request 323167 clean roof and piping from legacy roof leak, examine pipe as required.  
 Work request 324230 for leaking sight glass on 1A Core Spray pump.  
 Work request 324238 on paint on valve stem on 1-E21-V19  
 Work request 324324 on packing leakage on 1-E21-F002B  
 Work request 324326 on 2-E21-F001B-MO for oil seepage through flange for operator.  
 Work request 324329 2B Core Spray pump motor has no screen guards installed.

List of NCV/LIV/LERs Corrective Actions Reviewed

NCV 05000325/2007011-01, Inadequate Corrective Action for Fisher Model 9100 Unbonded Butterfly Valve Failures  
 NCV 05000325/2007011-02, Inadequate Loose Parts Analysis/Operability Evaluation for Fisher Butterfly Valve Taper Pin  
 NCV 05000325, 324/2006005-03, Failure to Periodically Calibrate Service Water Pump Discharge Pressure Gages  
 NCV 05000324/2007007-01, Failure to Adequately Evaluate and Correct Condition Adverse to Quality Resulting in 2C CSW Pump Failure  
 NCV 05000325/2006005-02, Failure to Follow Work Management Process  
 NCV 05000325/2007002-01, Incorrect Fuel Assembly Moved to Core  
 NCV 05000324/2007004-01, Diesel Generator Trip Due to Failure to Follow Procedure  
 NCV 05000324/2007003-01, Failure to Incorporate Operating Experience into Plant Procedures and Training  
 NCV 05000325,324/2007010-02, Goal Setting and Monitoring not Performed for an Emergency Diesel Generator  
 LER 05000324/2006-001, Loss of Startup Auxiliary Transformer Results in Unit 2 Manual Reactor Protection System Actuation  
 LER 05000324/2007-001, Operation Prohibited by Technical Specification 3.3.1.3, "Source Range Instrumentation"  
 LER 05000324,325/2006-007-001, Operations Prohibited by TS Due to Inoperable EDG  
 LER 05000324,325/2007-001, E1 to E3 Crosstie breaker unavailable due to misalignment.  
 LER 05000325/2007-02, TS Required Shutdown Due To EDG #4 Inoperability  
 LER 05000324/2006-002, Manual Scram Due to Conductivity Increase  
 LER 05000324/2006-003, Automatic Reactor Scram due to Neutron Monitoring System  
 AR 247311, Tie rods for the 1C Conventional Service Water pump Were Made of the Wrong Material [IR 07-04 LIV]  
 AR 227261, Unit 2 Control Rod Withdrawal Without an Operable Source Range Monitor [IR 07-03 LIV]  
 AR 237957, Unit 1 Condensate Storage Tank Limit Switches Removed From Service Without a Risk Assessment [IR 07-03 LIV]  
 NCR 183102, Failure to adequately investigate and determine the cause of a containment isolation valve stroke test failure [IR 07-07 LIV]

## BRUNSWICK PI&amp;R INSPECTION INFORMATION REQUEST

The following information request was provided to the licensee to support the PI&R team preparation week beginning 2/4/08:

1. Two copies each of the corporate and site level procedures and sub-tier procedures associated with the corrective action program. This should include procedures related to: 1) corrective action process, 2) operating experience program, 3) employee concerns program, 4) self-assessment program, 5) maintenance rule program and implementing procedures, 6) Operability Determination process, 7) Degraded/non-conforming condition process (e.g., RIS 2005-20), 8) System health process, or equivalent Equipment Reliability Improvement Programs, 9) PM deferral and AR/NCR extension process, 10) Top plant equipment problem list or equivalent characterized document.
  
2. List of all AR/NCRs initiated since January 1, 2007, sorted by the following responsible plant departments. In each department grouping, please provide the following information sorted by AR/NCR # - a) AR/NCR #, b) Priority, and c) AR/NCR Title.
  - 1) Emergency Preparedness;
  - 2) Health Physics;
  - 3) Chemistry; and,
  - 4) Security.
  
3. List of all AR/NCRs initiated since January 1, 2007, sorted by Priority, with the following information - a) AR/NCR #, b) Priority, and c) AR/NCR Title.
  
4. List of all AR/NCRs initiated since January 1, 2006, involving or associated with the below listed risk significant systems. Please sort by the system, and within each system provide the following information sorted by AR/NCR # - a) AR/NCR #, b) Priority, and c) AR/NCR Title.
  - 1) Residual Heat Removal System
  - 2) Supplemental Spent Fuel Cooling
  - 2) Core Spray
  - 4) Containment
  
5. List of all currently OPEN AR/NCRs and Work Orders for the four systems described above regardless of when initiated. Please sort by system, with the following information - a) AR/NCR # or Work Order #, b) date initiated, and c) title or brief description of the problem.
  
6. List of all deferred PMs for the four systems described above. Please sort by system, with the following information - a) original date due, b) frequency, and c) title or brief description of the problem. Also, include the associated PM deferral justification.
  
7. List of all currently extended AR/NCRs or overdue, sorted by initiation date, with the following information - a) AR/NCR #, b) Priority, and c) AR/NCR Title.

8. List of all AR/NCRs that have been voided or cancelled since January 1, 2007. Please sort by AR/NCR #, with title or description of problem, and reason voided or cancelled.
9. List of all anonymous AR/NCRs since January 1, 2006, sorted by AR/NCR# with the following information - a) AR/NCR #, b) priority, and c) AR/NCR Title.
10. Copy of all corrective action documents, and supporting information, associated with the closure of the IP 95002 URI 05000325, 324/2007010-01, Handling of Diesel Generator Problems by CAP, both Part 1 and 2. These documents should include the following - EDG Reliability Improvement Team Report, including AR 230789); AR 166409, EDG Bench Marking Report; AR 243397, EDG Performance Adverse Trend; EDG Reliability Equipment Improvement Project Plan (i.e., chart); and PM Optimization Plan for EDG.
11. List of all structures, systems, and components (SSC) which were classified as (a)(1) in accordance with the Maintenance Rule since January 1, 2007. Include applicable procedures for classifying systems or components as (a)(1), date and reason for being placed in (a) (1), and actions completed and current status. Also, provide copy of any self-assessment of the Maintenance Rule program conducted since January 1, 2007.
12. List of Maintenance Preventable Functional Failures (MPFF) of risk significant systems since January 1, 2007. Include actions completed and current status.
13. List of Maintenance Preventable Functional Failures affecting the systems listed in item 4. above since January 1, 2006. Include actions completed and current status.
14. Copies of latest System Health Reports for systems listed in item 4. Copies of system design basis documents, system description information, PI&Ds, etc., associated with these systems.
15. Corrective action closeout packages for all NRC findings and Licensee identified violations since January 1, 2007 (see attached).
16. Corrective action closeout packages for all LERs issued since 12/20/06 (see attached).
17. List of all NRC generic communications (e.g., Information Notices, Generic Letters, etc.) and industry operating experience documents (e.g., Part 21 reports, vendor information letters, information from other sites, etc.) evaluated by the site for applicability to the station, regardless of the determination of applicability, since January 1, 2007.
18. Copy of industry operating experience documents (i.e., Part 21 reports, vendor information letters, information from other sites, etc.) affecting the systems listed in item 4. above, since January 1, 2006. If documented in AR/NCRs, please sort by AR/NCR # with the following information - a) AR/NCR #, b) priority, and c) AR/NCR Title or brief description of the issue.

19. Copies of all quality assurance audits and/or assessments issued since January 1, 2007, including the last two audits/assessments of the corrective action program. Also, any self-assessment of the site safety culture conducted since January 1, 2007 should be provided.
20. Copies of all department self-assessments since January 1, 2007.
21. List of corrective action documents that have resulted from the Employee Concerns Program since January 1, 2007. (Note: This should be provided by the ECP Coordinator during an onsite interview with the PI&R team leader).
22. Copy of the most recent integrated plant trend report, departmental trend report(s), and corrective action trend report, including any human performance and equipment reliability trends.
23. Copy of the latest Corrective Action Program statistics (if exists) such as the number initiated by department, human performance errors by department, and others as may be available.
24. Copies of any minutes of meetings by the offsite safety review boards/groups since January 1, 2007.
25. List of AR/NCRs related to equipment aging issues of risk significant systems since January 1, 2002 (e.g., system erosion and/or corrosion problems; electronic component aging or obsolescence of circuit boards, power supplies, relays, etc.; environmental qualification). Please sort by AR/NCR# with the following information - a) AR/NCR #, b) priority, and c) AR/NCR Title.