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

April 29, 2005

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION REPORT NOS. 05000325/2005002 AND 05000324/2005002

Dear Mr. Gannon:

On March 31, 2005, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Brunswick Units 1 and 2 facilities. The enclosed integrated inspection report documents the inspection findings, which were discussed on April 13, 2005, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, two self-revealing findings of very low safety significance (Green) were identified. These findings were determined to involve violations of NRC requirements. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, 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 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/

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

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

Enclosure: Inspection Report 05000325/2005002 AND 05000324/2005002
w/Attachment: Supplemental Information

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REGION II

Docket Nos:	50-325, 50-324
License Nos:	DPR-71, DPR-62
Report Nos:	05000325/2005002 and 05000324/2005002
Licensee:	Carolina Power and Light (CP&L)
Facility:	Brunswick Steam Electric Plant, Units 1 & 2
Location:	8470 River Road SE Southport, NC 28461
Dates:	January 1, 2005 - March 31, 2005
Inspectors:	E. DiPaolo, Senior Resident Inspector J. Austin, Resident Inspector S. Vias, Senior Reactor Inspector (Section 1R12) P. VanDoorn, Senior Reactor Inspector (Section 1R08) J. Rivera-Ortiz, Reactor Inspector (Section 1R08) F. Wright, Senior Health Physicist (Sections 2OS1, 2OS2 and 2PS3) A. Nielsen, Health Physicist (Sections 2PS2 and 4OA1) G. MacDonald, Senior Project Engineer (Section 4OA3.2)
Approved by:	Paul Fredrickson, Chief Reactor Projects Branch 4 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000325/2005002, 05000324/2005002; January 1, 2005 - March 31, 2005; Brunswick Steam Electric Plant, Units 1 and 2; Problem Identification and Resolution and Event Followup.

The report covered a three-month period of inspection by resident inspectors and three announced inspections by regional-based inspectors. Two Green non-cited violations (NCVs) were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 609, "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 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. A self-revealing finding and non-cited violation of 10CFR50, Appendix B, Criterion XVI, was identified for failure to promptly identify a condition adverse to quality associated with mispositioned relay covers for several General Electric HGA relays on emergency bus E-1. The finding resulted in relay 1-E1-AE7-CL-B, which provides a confirmatory bus strip signal to the emergency diesel generator (EDG) 1 output breaker, being failed in the operated state. This caused emergency diesel generator EDG 1 to be in an inoperable condition from March 29, 2004 until the condition was discovered on August 16, 2004.

  The finding is greater than minor because it is associated with equipment performance and affected the functional capability of the system to respond to initiating events. The finding was evaluated using NRC Inspection Manual Chapter 0609 Appendix A. A Phase 3 Significance Determination Process analysis determined this finding to be of very low safety significance based on the limited number of hours the EDG load rating would have been exceeded. The finding is related to the cross-cutting area of problem identification and resolution due to the failure to identify a condition adverse to quality. (Section 4OA2)

- Green. A self-revealing finding and non-cited violation of 10CFR50, Appendix B, Criterion III, was identified for inadequate design controls in modification Engineering Service Request (ESR) 96-00700 which replaced obsolete inverters in Unit 1 and 2 analog trip units and the Unit 2 remote shutdown panel. The deficiency associated with this issue is inadequate design control associated with replacement of the Unit 2 remote shutdown panel power (RSDP) instrument power supply inverter which could have led to the loss of RSDP instrumentation and reactor core isolation cooling (RCIC) control under certain potential fire induced ground fault conditions.

The finding is more than minor because it affected the protection against external factors (fire) attribute of the Mitigating Systems Cornerstone in that it potentially affected the availability of RCIC from RSDP. No actual severe fires requiring main control room (MCR) evacuation and use of RCIC have occurred. Given that no credible fire scenario was possible, this safe shutdown finding had low degradation since MCR functions would not be completely lost for any scenario which could cause loss of the RSDP functions. Since the safe shutdown finding had low degradation, a Phase 1 Significance Determination Process review screened the finding as very low safety significance. (Section 4OA3.2)

B. Licensee Identified Violations

None

REPORT DETAILS

Summary of Plant Status

Unit 1 began the report period operating at full power. On January 7, power was reduced to approximately 41 percent following the trip of the B recirculation pump due to a plant voltage transient. The voltage transient was the result of switchyard power circuit breaker 24B faulting while being placed in service following maintenance. Following restoration of the B recirculation pump, the unit was returned to full power on January 8. A planned downpower to approximately 53 percent was initiated on February 25 for fuel leak suppression management and offsite grid system maintenance. Power was further reduced (emergent) on February 26 to approximately 15 percent in order to facilitate a drywell entry to investigate elevated unidentified leakage. Unit 1 returned to full power on March 1 where it remained for the duration of the inspection period.

Unit 2 began the report period operating at full power. On January 18, the unit commenced final coastdown to Refueling Outage (RFO) B217R1, which commenced on March 4. Following the completion of refueling activities the unit entered Mode 4 (Cold Shutdown) on March 27. At the end of the inspection period, the unit was still in Mode 4 and making preparations for startup.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R04 Equipment Alignment

a. Inspection Scope

Partial System Walkdowns

The inspectors performed three partial walkdowns of the below listed systems to verify that the systems were correctly aligned while the redundant train or system was inoperable or out-of-service (OOS) or, for single train risk significant systems, while the system was available in a standby condition. The inspectors assessed conditions such as equipment alignment (i.e., valve positions, damper positions, and breaker alignment) and system operational readiness (i.e., control power and permissive status) that could affect operability. The inspectors verified that the licensee identified and resolved equipment alignment problems that could cause initiating events or impact mitigating system availability. The inspectors reviewed Administrative Procedure ADM-NGGC-0106, Configuration Management Program Implementation, to verify that available structures, systems or components (SSCs) met the requirements of the licensee's configuration control program. Documents reviewed are listed in the Attachment.

- EDG #2 when EDG #1 was OOS for planned maintenance activities on February 15, 2005
- Unit 2 residual heat removal (RHR) system in shutdown cooling mode on March 5, 2005

- Unit 2 suppression chamber equipment and systems while in Mode 4 (Cold Shutdown) and making preparation for plant startup on March 31, 2005 (risk significant system)

Complete System Walkdown

The inspectors conducted a detailed review of the alignment and condition of the Unit 2 RHR System. The inspector reviewed the Updated Final Safety Analysis Report (UFSAR), associated attachments of Operating Procedure 0OP-13.1, Supplemental Spent Fuel Pool Cooling System, and the system flow diagram (Drawing FP-85293). In determining correct system lineup, the inspectors also reviewed the documents listed in the Attachment.

To assess the licensee's identification and resolution of problems in this area, the inspectors reviewed the following action requests (ARs):

- AR 153909, Unit 1 B standby liquid control train inoperable due to vapor voiding in discharge piping
- AR 153536, Unit 2 drywell main steam line hydraulic snubber found with no hydraulic fluid
- AR 152877, Unit 2 main steam line spring can found degraded

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

Fire Area Walkdowns

The inspectors reviewed current ARs and work orders (WOs) associated with the fire suppression system to confirm that their disposition was in accordance with the Fire Protection Program Manual, OAP-033. The inspectors reviewed the status of ongoing surveillance activities to verify that they were current to support the operability of the fire protection system. In addition, the inspectors observed the fire suppression and detection equipment to determine whether any conditions or deficiencies existed which would impair the operability of that equipment. Documents reviewed are listed in the Attachment. The inspectors toured the following areas important to reactor safety and reviewed the associated prefire plans to verify that the requirements for fire protection design features, fire area boundaries, and combustible loading were met:

- Unit 2 Reactor Building East and West 50' Elevation (2 areas)
- Unit 2 High Pressure Coolant Room -17' Elevation (1 area)
- EDG Building Supply Air Fan Room 50' Elevation (1 area)
- Unit 2 Reactor Building East and West 20' Elevation (2 areas)

- Unit 2 Drywell and Drywell Entry 20' Elevation (2 areas)

Fire Drill

On March 9, 2005, the inspectors observed an unannounced plant fire drill in the Unit 2 service water building to assess the fire brigade performance and to verify that proper firefighting techniques for the type of fire encountered were utilized. The inspectors monitored the fire brigade's use of protective equipment and firefighting equipment to verify that preplanned firefighting procedures and appropriate firefighting techniques were used, and to verify that the directions of the fire brigade leader were thorough, clear, and effective. The inspectors attended the critique to confirm that appropriate feedback on performance was provided to brigade members and to ensure that areas for improvement were properly identified for licensee follow-up. In preparing for and evaluating the drill the inspectors reviewed the preplanned drill scenario, Drill 05-F-SW-03 (Rev. 0), and the fire plan for the area as documented in service water building (4') prefire plans.

To assess the licensee's identification and resolution of problems in this area, the inspectors reviewed an inspector-identified issue documented in AR 153157. The issue involved the observation that the radiological controlled area boundary point of egress was bypassed by fire brigade personnel during the observed fire drill.

b. Findings

No findings of significance were identified.

1R06 Internal Flood Protection Measures

a. Inspection Scope

The inspectors reviewed the licensee's internal flooding analysis as described in UFSAR Section 3.4.2, Protection From Internal Flooding. Due to the risk significance of equipment in the RHR rooms and high pressure coolant injection room (2 plant areas), the inspectors reviewed the UFSAR Section 3.4.2 analysis of the effects of postulated piping failures for these two areas to determine if the analysis assumptions and conclusions were based on the current plant configuration. The internal flooding design features and equipment for coping with internal flooding were inspected. The walkdown included sources of flooding and drainage, sump pumps, level switches, watertight doors, curbs, pedestals and equipment mounting. The inspectors reviewed the testing of the level alarms and reviewed the procedures for coping with internal flooding.

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection (ISI) Activities

a. Inspection Scope

The inspectors observed in-process ISI work activities on Unit 2, and reviewed selected ISI records. The observations and records were compared to the Technical Specifications (TS) and the applicable Code (ASME Boiler and Pressure Vessel Code, Section XI, 1989 Edition, with no Addenda) to verify compliance.

The inspectors observed in process ultrasonic testing (UT) examinations performed on two welds to verify the exams were being performed in accordance with the ASME Boiler and Pressure Vessel Code, Section XI, Appendix VIII, 1995 Edition including 1996 Addenda as modified by the Performance Demonstration Initiative (PDI) Program. The exams included a reactor pressure vessel weld, and a feedwater pipe weld. The inspectors also observed the magnetic particle testing (MT) examination of a feedwater pipe attachment weld. The inspectors reviewed records of the examinations including calibrations, equipment certifications, consumable certifications, and personnel qualifications. The subject welds were reviewed as follows:

- UT on weld 2B11-RPV-N1A - Nozzle to shell weld on Reactor Recirculation pipe (Nozzle 1A on B suction). Eight scanned directions were observed.
- UT on weld 2B214-2-4-SWE - Reactor Feedwater pipe weld, B Loop. Four scanned directions were observed.
- MT on weld 2-B21-4CH15-ATT - Pipe integral attachment weld (Feedwater, B Loop). Magnetic Yoke examination observed.

The inspectors also reviewed documentation regarding the welding process and examination of two ASME Class 2 welds associated with a RHR elbow replacement (Weld Nos. 1-E11-715 & 716). The review included the weld data sheets, welder qualification records, filler metal certifications, and the radiograph NDE report and films. The inspectors reviewed information to verify that any discontinuities shown in the film were documented and evaluated in accordance with the ASME Code.

In addition, the inspectors conducted a general walkdown through the containment drywell to look for any aging phenomenon and liner bulging, to verify that the liner bulging problem previously identified on Unit 1 was being appropriately addressed by visual and UT inspections. The inspectors examined the accessible interior surfaces of the Unit 2 drywell at different elevations and reviewed licensee documentation of visual and UT inspections.

The inspectors reviewed three samples of ISI issues in the licensee's corrective action program to confirm that problems were being identified and placed in the corrective action program, and appropriate corrective actions were being initiated.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification

a. Inspection Scope

Quarterly Review

The inspectors observed licensed operator performance and reviewed the associated training documents during simulator training sessions for cycle 2005-01, on February 3, 2005. The simulator observation and review included an evaluation of emergency operating procedure and abnormal operating procedure utilization. The inspectors reviewed Procedure OTPP-200, Licensed Operator Continuing Training Program, to verify that the program ensures safe power plant operation. The scenarios tested the operators' ability to respond to an anticipated transient without scram, reactor feed pump malfunctions, and loss of the reactor core isolation cooling (RCIC) system. The inspectors reviewed the operators' activities to verify consistent clarity and formality of communication, conservative decision-making by the crew, appropriate use of procedures, and proper alarm response. Group dynamics and supervisory oversight, including the ability to properly identify and implement appropriate TS actions, regulatory reports, and notifications, were observed. The inspectors observed that appropriate feedback was provided to the licensed operators.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness

a. Inspection Scope

Biennial Review

The week of February 22, 2005, the inspectors reviewed the Maintenance Rule (MR) (a)(3) periodic assessment, "BNP Maintenance Rule Program Periodic Self-Assessment Plan," for June 1, 2001 to May 31, 2003, dates of assessment July 21-24, 2003, with a follow-up evaluation performed on August 20, 2004 (Assessment #78456) for the period June 1, 2003 to August 4, 2004. The inspection was to determine the effectiveness of the assessment and that it was issued in accordance with the time requirements of the MR and included evaluation of balancing reliability and unavailability, (a)(1) activities, (a)(2) activities, and use of industry operating experience. To verify compliance with 10 CFR 50.65, the inspectors reviewed selected MR activities covered by the assessment period for the following MR systems: System 5110 – diesel jacket water & dg demin. water, System 5112 – diesel generator starting air, and System 5175 – 480kv AC distribution. Also, the inspectors reviewed systems currently identified as a(1): System 1000 - primary containment isolation and System 6135 - instrument air, and held discussions with the MR Coordinator about the long standing a(1) systems and their long term corrective actions and plans.

During the inspection, the inspectors reviewed selected plant WO data, assessments, modifications, and the site guidance implementing procedure. The inspectors also discussed and reviewed relevant Corrective Action Program (CAP) ARs, reviewed generic operations event data, probabilistic risk reports, and discussed issues with system engineers. Operational event information was evaluated by the inspectors in its use in MR functions. The inspectors selected WOs, an MR assessment, and other corrective action documents of systems recently removed from 10 CFR 50.65 a(1) status and those in a(1) status for some period to assess the justification for their status. The documents were compared to the site's MR program criteria, and the MR a(1) evaluations and rule related data bases. The inspectors attended a MR expert panel meeting on February 23, 2005. Specific procedures and documents reviewed are listed in the Attachment.

Quarterly Review

For the three equipment issues described in the below listed ARs, the inspectors reviewed the licensee's implementation of the MR with respect to the characterization of failures, the appropriateness of the associated MR a(1) or a(2) classification, and the appropriateness of the associated a(1) goals and corrective actions. The inspectors also reviewed operations logs and licensee event reports to verify unavailability times of components and systems, where applicable. Licensee performance was evaluated against the requirements of Procedure ADM-NGG-0101, Maintenance Rule Program. The inspectors also reviewed deficiencies related to the work activities listed below to verify that the licensee had identified and resolved deficiencies in accordance with Procedure CAP-NGGC-0200, Corrective Action.

- AR 0015095, Unit 1 lighting and communication inverter failed to hard-source
- AR 152004, RHR minimum flow valve pressure switch 1-E-11-PDIS-N021B would not activate as required
- AR 147626, 230kv Bus 1B trip resulting in 1B reactor recirculation pump trip

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

The inspectors reviewed the licensee's implementation of MR (a)(4) requirements during scheduled and emergent maintenance activities, using Procedure OAP-025, BNP Integrated Scheduling and Technical Requirements Manual (TRM) 5.5.13, Configuration Risk Management Program. The inspectors reviewed the effectiveness of risk assessments performed prior to changes in plant configuration for maintenance activities (planned and emergent). The review was conducted to verify that, upon unforseen situations, the licensee had taken the necessary steps to plan and control the

resultant emergent work activities. The inspectors reviewed the applicable plant risk profiles, work week schedules, and WOs for the following OOS equipment or conditions:

- WO 609333, Unit 2 switchyard excavating activities during EDG #1 outage on February 15, 2005 (planned)
- AR 146995, Unit 1 C RHR Pump Discharge Drain Line Through-wall leak discovered on January 1, 2005 (emergent)
- AR 152101, Compensatory measure during troubleshooting and repair of the Unit 1B reactor recirculation pump speed control circuit following and unexpected speed increase occurring on February 26, 2005 (emergent)
- WO 686481, EDG #1 automatic voltage regulator failure to return to preset voltage setpoint, placing Unit 1 in a short duration TS limiting condition for operation on March 14, 2005 (emergent)
- AR 152974, Unit 1 elevated risk following the Unit 2 B-1 125v DC battery charge voltage control problems following preventive maintenance on March 7, 2005 (emergent)
- AR 147053, Risk assessment of work in conjunction with repair of fire protection header position indicating valve PIV-20 during the week of January 4, 2005

To assess the licensee's identification and resolution of problems in this area, the inspectors reviewed an inspector-identified issue documented in AR 151245. The issue involved process risk review for work activities within the switchyard and transformers areas during times when EDGs or emergency buses are unavailable.

b. Findings

No findings of significance were identified.

1R14 Operator Performance During Non-Routine Plant Evolutions and Events

a. Inspection Scope

The inspectors reviewed or observed operator performance in response to the following transients and abnormal conditions. Operator logs, plant computer data, and associated operator actions were reviewed to assess operator performance.

- AR 147626, 230 kv bus 1B trip and 1B reactor recirculation pump trip, occurring on January 7, 2005
- AR 151343, Unit 1 entry into Abnormal Operating Procedure 20.0, Pneumatic (Air/Nitrogen) System Failures (Rev. 26), on February 17, 2005, due to a loss of service air pressure
- AR 152101, Unit 1B reactor recirculation pump speed increase while resetting low speed limiter on February 26, 2005

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the operability evaluations associated with the following six issues, listed below, which affected risk significant systems or components, to assess, as appropriate: 1) the technical adequacy of the evaluations; 2) the justification of continued system operability; 3) any existing degraded conditions used as compensatory measures; 4) the adequacy of any compensatory measures in place, including their intended use and control; and 5) where continued operability was considered unjustified, the impact on TS limiting conditions for operations (LCOs) and the risk significance. In addition to the reviews, discussions were conducted with the applicable system engineer regarding the ability of the system to perform its intended safety function.

- AR 153684, compensatory measures and operability assessment of failure of EDG #1 to automatically return to the preset voltage setpoint following shutdown
- AR 154139, TS basis for maximum emergency diesel generator voltage of 4300 volts
- AR154336, Control rod blade 42-39 found missing pin and roller
- AR 150671, Containment atmosphere dilution tank inventory depletion and degraded condition
- AR 150922, EDG building recirculation damper test failures
- AR 154268, Through wall leak on conventional service water header

To assess the licensee's identification and resolution of problems in this area, the inspectors reviewed the following ARs:

- AR 153537, Main steam isolation valve 2-B21-F022D reactor protection system limit switch found operating outside of specification
- AR 154139, Technical Specification basis for maximum EDG voltage exceeded during Unit 2 refueling outage (inspector-identified)
- AR 150862, Unit 2 B RHR pump shaft seal leak

b. Findings

No findings of significance were identified.

1R16 Operator Work-Arounds (OWAs)

a. Inspection Scope

Selected OWAs

The inspectors reviewed the status of OWAs for Units 1 and 2 to verify that the functional capability of the system or operator reliability in responding to an initiating event was not affected. The inspectors reviewed, in detail, an OWA associated with

Operations Standing Instruction SI-05-13 (Unit 1B Reactor Recirculation Pump Operating Guidance Following Rapid Flow Increase Event) occurring on February 26, 2005. The review evaluated the effect of the OWA on the operator's ability to implement abnormal or emergency operating procedures during transient or event conditions. The inspectors compared licensee actions to the requirements of Procedure 0OI-01.08, Control of Equipment and System Status and held discussions with operations personnel related to the OWA reviewed.

Cumulative Effects Review

The inspectors reviewed the cumulative effects of all identified Units 1 and 2 OWAs to verify that they did not adversely impact the following: 1) the reliability, availability, and potential for misoperation of the effected systems; 2) the potential for increasing an initiating event frequency; and 3) impact on the ability of operators to respond in a correct and timely manner to a plant transient and accident. Aggregate impacts of the identified OWAs on each individual operator watch station were also reviewed.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications

a. Inspection Scope

The inspectors reviewed a permanent plant modification documented in Engineering Change 50055, Unit 2 Main Power Transformer Replacement. The inspectors reviewed the design adequacy of the modification for material compatibility which included functional properties, environmental qualification, and seismic evaluation. One purpose of the review was to verify that the modification met the design bases and the design assumptions. Another purpose was to verify that modification preparation, staging, and implementation did not impair emergency/abnormal operating procedure actions and key safety functions. The inspectors also reviewed the modification to verify that the post-modification testing would establish operability and that unintended system interactions would not occur, and that testing demonstrated that the modification acceptance criteria were met.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

For the post-maintenance tests and maintenance activities listed below, the inspectors reviewed the test procedure and witnessed the testing and/or reviewed test records to

confirm that the scope of testing adequately verified that the work performed was correctly completed, and that the test demonstrated that the affected equipment was capable of performing its intended function and was operable in accordance with TS requirements. The inspectors reviewed the licensee's actions against the requirements in Procedure 0PLP-20, Post Maintenance Testing Program.

- WO 515361, replace Unit 2 B-1 125v DC battery charger amplifier card and resistors
- AR 147274, 1C RHR pump 4160 V breaker control power indication problem
- AR 147661, recirculation pump 1B trip due to a switchyard fault
- AR 152004, RHR pump minimum flow valve position indication switch not activating
- WO 683517, Troubleshoot and repair Unit 2 scram discharge volume level indicators

To assess the licensee's identification and resolution of problems in this area, the inspectors reviewed the following ARs:

- AR 154028, Local power range monitor 03-37 mechanical joint leakage following installation
- AR 154911, Main turbine valve limit switch post-maintenance test requirements

b. Findings

No findings of significance were identified.

1R20 Refueling Outage Activities

a. Inspection Scope

The inspectors evaluated Unit 2 RFO B217R1 activities which commenced on March 4, 2004. At the completion of the inspection, fuel movement was complete and the unit was in Mode 4 (Cold Shutdown) and preparing for startup activities. Documents reviewed are listed in the Attachment. The following specific areas were reviewed:

Outage Plan. The inspectors reviewed Brunswick Nuclear Plant Unit 2 Safe Shutdown Risk Assessment, for RFO B217R1. The inspectors verified that the licensee had considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. The inspectors' review of this report was compared to the requirements in Procedure 0AP-022, BNP Outage Risk Management. The review verified that for identified high risk significant conditions, contingency measures were identified. The inspectors frequently monitored the risk condition during the outage.

Shutdown and Cooldown. The inspectors observed portions of the Unit 2 shutdown to enter the outage to verify that activities were in accordance with General Procedure 0GP-5.0, Unit Shutdown. The inspectors verified that the licensee monitored cooldown

restrictions by performing Procedure 2PT-01.7, Heatup/cooldown Monitoring, to assure that TS cooldown restrictions were satisfied.

Licensee Control of Outage Activities. The inspectors observed and reviewed several specific activities, evolutions, and plant conditions to verify that the licensee maintained defense-in-depth commensurate with the outage risk control plan. The inspectors reviewed configuration changes due to emergent work and unexpected conditions were controlled in accordance with the outage risk control plan. The inspectors reviewed the following specific items, as specified:

- Decay Heat Removal and Reactor Coolant System Instrumentation. The inspectors reviewed decay heat removal procedures and observed decay heat removal systems' parameters to verify proper removal of decay heat and that reactor vessel, reactor cavity, and spent fuel pool level instruments were configured to provide accurate indication. The inspectors also conducted main control room panel walkdowns and walked down portions of the systems in the plant to verify system availability. The inspectors reviewed operational logs to verify that procedure and TS requirements to monitor and record reactor coolant temperature were met.
- Reactivity Control. The inspectors observed licensee performance during shutdown, outage, and refueling activities to verify that reactivity control was conducted in accordance with procedures and TS requirements. The inspectors conducted a review of outage activities and risk profiles to verify activities that could cause reactivity control problems were identified. Licensee performance was compared to Procedure 0AP-038, Reactivity Management Program Manual.
- Inventory Control. The inspectors observed operator monitoring and control of reactor temperature and level profiles and monitored outage work and configuration control for activities that had the potential to drain the reactor vessel. This was performed to verify that they were performed in accordance with the outage risk plan.
- Electrical Power. The inspectors reviewed the following licensee activities related to electrical power during the RFO to verify that they were in accordance with the outage risk plan:

    - Controls over electrical power systems and components to ensure emergency power was available as specified in the outage risk report
    - Controls and monitoring of electrical power systems and components and work activities in the power transmission yard
    - Operator monitoring of electrical power systems and outages to ensure that TS requirements were met

Refueling Activities. The inspectors reviewed refueling activities to verify fuel handling operations were performed in accordance with TS and fuel handling procedures and that controls were in place to track fuel movement. The inspectors reviewed refueling floor and plant controls to verify that the foreign material exclusion controls were established.

Identification and Resolution of Problems. The inspectors reviewed ARs to verify that the licensee was identifying problems related to RFO activities at an appropriate threshold and entering them in the corrective action program. The inspectors reviewed the following issues identified during the outage to verify that the appropriate corrective actions were implemented:

- AR 153110, Supplemental spent fuel pool cooling system secondary pump trip during test run
- AR 153060, Drywell liner personnel airlock penetration sleeve bulging due to liner degradation
- AR 154777, Control rod 02-23 not coupled following blade replacement
- AR 152867, Drywell head seal failed local leak rate test
- AR 154418, Extent-of-condition assessment for control rod blade 46-43 missing blade roller and pin (inspector-identified)
- AR 152859, Main steam isolation valve 2-B21-F028A failed local leak rate test

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

a. Inspection Scope

Routine Surveillance Testing

The inspectors either observed surveillance tests or reviewed test data for the five risk significant SSC surveillances, listed below, to verify the tests met TS surveillance requirements, UFSAR commitments, in-service testing (IST), and licensee procedural requirements. The inspectors assessed the effectiveness of the tests in demonstrating that the SSCs were operationally capable of performing their intended safety functions. The inspectors reviewed the documents listed in the Attachment.

- Process Instrument Calibration Procedure, 0PIC-TT015, Moore Industries Mode STP RTD Transmitter Calibration, performed on January 31, 2005, on Unit 1 feedwater temperature instrument 1-B21-TT-N602B
- Periodic Test 0PT-34.6.7.1, Rollup Fire Door Test, performed on EDG cell air exhaust/recirculation rollup doors the week of February 14, 2005
- 0PT-14.1.2, Scram Discharge Volume Visual Inspection, performed on Unit 2 on March 4, 2005
- 0PT-12.8.1, Breaker Alignment Operability Test
- 0PT-20.3a.2, B21-F022B and B21-F028B Leak Test (B main steam isolation valve local leak rate test), performed on Unit 2 during RFO B217R1

Inservice Surveillance Testing

The inspectors reviewed the performance of inservice and predictive maintenance testing performed on the Unit 2 conventional service water-to-vital header cross-connect valve 2-SW-V111. The inspectors evaluated the effectiveness of the licensee's American Society of Mechanical Engineers (ASME) Section XI testing program to determine equipment availability and reliability. The inspectors evaluated selected portions of the following areas: 1) testing procedures; 2) acceptance criteria; 3) testing methods; 4) compliance with the licensee's IST program, TS, selected licensee commitments, and code requirements; 5) range and accuracy of test instruments; and 6) required corrective actions. The inspectors also assessed any applicable corrective actions taken. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed Plant Operating Manual 0PLP-22, Temporary Changes, to assess implementation of the below listed temporary modifications. The inspectors reviewed these temporary modifications to verify that the modifications were properly installed and whether they had any effect on system operability. The inspectors also assessed drawings and procedures for appropriate updating and post-modification testing.

- EC 60445, Evaluation of valve 2-B32-F031B (B recirculation pump discharge isolation valve) with bonnet studs removed during seal welding operations
- AR 148406, Temporary makeup demineralized water tank level indicator frozen

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstones: Occupational Radiation Safety and Public Radiation Safety

2OS1 Access Controls To Radiologically Significant Areas

a. Inspection Scope

Access Controls The inspectors reviewed and evaluated licensee guidance and its implementation for controlling and monitoring worker access to radiologically significant areas and tasks associated with the Unit 2 RFO (B217R1). The inspectors evaluated changes to, and adequacy of procedural guidance; directly observed implementation of established administrative and physical radiological controls; appraised radiation worker and technician knowledge of, and proficiency in implementing radiation protection activities; and assessed radiation worker (radworker) exposures to radiation and radioactive material.

The inspectors directly observed controls established for occupational radiation workers and health physics technician (HPT) staff in potential airborne radioactivity areas, radiation areas, high radiation areas (HRA), and locked-high radiation areas (LHRA). Controls and their implementation for LHRA keys and for storage of irradiated material within the spent fuel pool (SFP) locations were reviewed and discussed in detail. Established radiological controls were evaluated for selected tasks including diving activities associated with Unit 2 (U2) steam dryer maintenance, repair activities performed on FO31B recirculation valve within the U2 drywell; and radioactive waste (radwaste) processing, storage, and shipping. In addition, licensee controls for areas where dose rates could change significantly as a result of plant shutdown and refueling operations were reviewed and discussed.

For selected tasks, the inspectors attended pre-job briefings and reviewed radiation work permit (RWP) details to assess communication of radiological control requirements to workers. Occupational workers' adherence to selected RWPs and HPT proficiency in providing job coverage were evaluated through direct observations and interviews with licensee staff. Electronic dosimeter (ED) alarm set points and worker stay times were evaluated against area radiation survey results for diving activities associated with U2 steam dryer maintenance, and various maintenance activities within the U2 drywell. Worker exposure, as measured by ED and by licensee evaluations of skin doses resulting from skin contamination events during current outage activities were reviewed and assessed independently. For HRA tasks involving significant dose gradients, e.g., diving activities, the inspectors evaluated the use and placement of whole body and extremity dosimetry to monitor worker exposure.

Postings and physical controls established within the radiologically controlled area (RCA) for access to the U2 drywell and torus; U2 reactor building (RB) and turbine building (TB) locations; radwaste building; and the RCA yard area were evaluated during facility tours. The inspectors independently measured radiation dose rates within the U2 RB, TB, and radwaste building; and directly observed conduct of licensee radiation

surveys for U2 drywell areas, and for radioactive material/waste shipping tasks. Survey results were compared to current licensee surveys and assessed against established postings and radiation controls.

The inspectors evaluated implementation and effectiveness of licensee controls for both airborne and external radiation exposure. The inspectors reviewed and discussed selected whole-body count (WBC) analyses conducted since the last inspection. This was performed to evaluate the implementation and effectiveness of personnel monitoring and administrative and physical controls including air sampling, barrier integrity, engineering controls, and postings for tasks having the potential for individual worker internal exposures to exceed 30 millirem (mrem) committed effective dose equivalent (CEDE). Effectiveness of external radiation exposure controls were evaluated through review and discussions of individual worker dose as measured by ED for selected outage tasks.

Radiation protection program activities were evaluated against 10 CFR 19.12; 10 CFR 20, Subparts B, C, F, G, H, and J; UFSAR details in Section 12, Radiation Protection; TS Sections 5.4, Procedures and 5.7, High Radiation Areas ; and approved licensee procedures. Licensee guidance documents, records, and data reviewed within this inspection area are listed in the Attachment.

Problem Identification and Resolution Licensee nuclear condition report (NCR) documents associated with access controls to radiologically significant areas were reviewed and assessed. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee procedure CAP-NGGC-0200, Corrective Action Program, Revision (Rev.) 14. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

2OS2 As Low As Reasonably Achievable (ALARA)

a. Inspection Scope

ALARA The inspectors reviewed pertinent information regarding plant collective exposure history including recent year performance trends and ongoing activities during the B217R1 RFO. Both outage and non-outage ALARA programs were reviewed and discussed with licensee representatives. The ability of the licensee's methodology for estimating job exposures was reviewed and evaluated. Approximately eight of the highest dose jobs were reviewed during the inspection and discussed with the ALARA staff. Any inconsistencies between intended and actual work activity doses were discussed with the ALARA staff.

The inspectors attended pre-job briefings and evaluated the communication of ALARA goals, RWP requirements, and industry lessons-learned to job crew personnel.

Reviews were made to verify the licensee had established work plans, engineering and exposure work controls, and RWPs that were ALARA. The ALARA work activities were based on historical data, industry techniques, and ALARA staff recommendations.

The inspectors evaluated the participation, contributions, and communications between management, ALARA staff, maintenance first-line supervisors, and workers in implementing the plant's ALARA program. The inspectors also evaluated the communications between plant groups including ALARA, radiation protection, planning, operations, and engineering in the pre-job planning process. Included in this review were the licensee's methods for adjusting exposure estimates or re-planning work when unexpected changes in scope or emergent work was encountered. The licensee's ability to address these opportunities were closely evaluated. The inspectors reviewed Plant ALARA Committee meeting minutes.

The process for shielding, both permanent and temporary, was reviewed for effectiveness and efficiency with the ALARA staff. ALARA shielding was observed directly in plant walk-downs, remotely with cameras, and in licensee pre-job briefing materials. The inspectors noted the use of water as shielding when appropriate in pre-job briefings. Job-site inspection activities were combined with the observations discussed in Section 2OS1. Radiation worker practices and health physics technician coverage were evaluated for proper radiation protection and ALARA techniques during observations of those job site activities. High dose jobs were selected when available.

The inspectors reviewed licensee documents and records concerning the historical source terms and the licensee's plans to maintain source-term controls and make source-term reductions. The licensee tracks and trends plant dose rates for use in evaluating dose reduction processes. The inspectors reviewed the licensee's use of hydrogen water chemistry and zinc injection. The inspectors observed some use of the reactor water clean-up (RWCU) system for clean up during the outage.

Plant exposure history and data reported to the NRC pursuant to 10 CFR 20.2206 were reviewed, as were established goals for reducing collective exposure during the B217R1 outage. The inspectors reviewed procedural guidance for dosimetry issuance and exposure tracking. The inspectors also examined dose records of declared pregnant workers to evaluate assignment of gestation dose. In addition, selected individual access records were reviewed for dose received during work in areas with high dose rate gradients.

ALARA program activities and their implementation were reviewed against 10 CFR Part 20, and approved licensee procedures. In addition, licensee performance was evaluated against Regulatory Guide (RG) 8.8, Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations will be As Low As Reasonably Achievable; RG 8.10, Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As is Reasonably Achievable; and RG 8.13, Instruction Concerning Prenatal Radiation Exposure. Procedures and records reviewed within this inspection area are listed in the Attachment.

Enclosure

Problem Identification and Resolution The inspectors reviewed recent self-assessments and audits concerning the radiation protection program including ALARA activities. The staff also reviewed corrective action documents (NCRs) and summaries of numerous ARs. The inspectors evaluated the licensee's ability to identify, characterize, prioritize, and resolve the identified issues in accordance with licensee procedure CAP-NGGC-0200, Corrective Action Program, Rev. 14. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

2PS2 Radioactive Material Processing and Transportation

a. Inspection Scope

Waste Processing and Characterization Selected liquid and solid radwaste processing system components were inspected for material condition and for configuration compliance with the UFSAR and the Process Control Program (PCP). Inspected equipment included floor drain tanks, resin transfer piping, resin and filter packaging components, and abandoned centrifuge equipment. The inspectors also observed processing of potentially contaminated bagged waste and sluicing of powdered resin from a condensate phase separator to a shipping liner. The inspectors discussed component function, processing system changes, and radwaste program implementation with licensee staff.

The 2003 Effluent Report and radionuclide characterizations from 2003 - 2004 for each major waste stream were reviewed and discussed with the radwaste staff. For RWCU powdered resin and dry active waste, the inspectors evaluated analyses for hard-to-detect nuclides, reviewed the use of scaling factors, and examined comparison results between licensee waste stream characterizations and outside laboratory data. Waste stream mixing and concentration averaging methodology for powdered resin was evaluated and discussed with radwaste operators. The inspectors also reviewed the licensee's procedural guidance for monitoring changes in waste stream isotopic mixtures.

Radwaste processing activities were reviewed for compliance with the licensee's PCP and UFSAR, Chapter 11. Waste stream characterization analyses were reviewed against regulations detailed in 10 CFR Part 20, 10 CFR Part 61, and guidance provided in the Branch Technical Position on Waste Classification and Waste Form. Reviewed documents are listed in the Attachment.

Transportation The inspectors directly observed preparation activities for a shipment of contaminated laundry. The inspectors noted package markings and placarding, performed independent dose rate measurements, and interviewed shipping technicians regarding Department of Transportation (DOT) regulations. The inspectors also

evaluated emergency response information via a phone call placed to the listed emergency response number as the shipment was in-transit.

Five shipping records were reviewed for consistency with licensee procedures and compliance with NRC and DOT regulations. The inspectors reviewed emergency response information, DOT shipping package classification, radiation survey results, and evaluated whether receiving licensees were authorized to accept radioactive materials. Licensee procedures for opening and closing Type A boxes and Type B shipping casks were compared to recommended vendor protocols and certificate of compliance requirements. In addition, training records for selected individuals currently qualified to ship radioactive material were reviewed.

Transportation program implementation was reviewed against regulations detailed in 10 CFR Part 20, 10 CFR Part 71, 49 CFR Parts 172-178; as well as the guidance provided in NUREG-1608. Training activities were assessed against 49 CFR Part 172 Subpart H. Documents reviewed during the inspection are listed in the Attachment.

Problem Identification and Resolution Four ARs and one self-assessment were reviewed in detail and discussed with licensee personnel. The inspectors assessed the licensee's ability to characterize, prioritize, and resolve the identified issues in accordance with Procedure CAP-NGGC-0200, Corrective Action Program, Rev. 14. Documents reviewed for problem identification and resolution are listed in the Attachment.

b. Findings

No findings of significance were identified.

2PS3 Radiological Environmental Monitoring Program (REMP) and Radioactive Material Control Program

a. Inspection Scope

The inspectors followed up on events that were issues of NRC-wide concern regarding the uncontrolled release of radioactive materials from the RCA.

b. Findings

No findings of significance were identified; however, three examples of a minor violation were identified for failure to control and maintain constant surveillance of licensed material that was not in storage, as prescribed by 10 CFR 20.1802. Two of these examples occurred shortly after the 2004 Brunswick Unit 1 RFO (B115R1). On April 13, 2004 and April 15, 2004, the licensee was informed that small quantities of licensed radioactive material were discovered on workers' clothing during in-processing whole body counts being conducted at the North Anna and Arkansas 1 nuclear facilities, respectively. The contaminated individuals involved in both of the cases had most recently worked for Brunswick during the B115R1 outage. The approximate levels of

contamination found on their clothing ranged from 0.6 to 5.96 nanocuries (nCi) of Co-60, and smaller quantities of other radioisotopes.

Following B115R1, Brunswick was notified of a third apparent release of small quantities of licensed radioactive material from the plant. On July 26, 2004, Brunswick was contacted by Crystal River Nuclear Plant after contamination had been found on a worker's clothing during incoming whole body counting. The contaminated individual had most recently worked at Brunswick. Whole body counter results at Crystal River identified 3.1 nCi of Co-58, 25 nCi of Co-60, and 2.8 nCi of Cs-137.

For all three cases, the inspectors verified that the quantities of radioactive material were at or below the detection limits of the licensee's personnel contamination monitoring equipment. The inspectors reviewed the licensee's program for release of potentially contaminated personnel and equipment, and identified no concerns associated with the technical bases for the monitoring equipment used, nor found any performance deficiencies regarding the radiation monitoring program or its implementation. These issues were entered into the licensee's CAP as ARs 00124499, 00133662, and 00154921. This minor violation is being documented because the uncontrolled release of radioactive material to the public domain is an issue of NRC-wide concern.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification

a. Inspection Scope

The inspectors sampled licensee records to verify the accuracy of reported performance Indicator (PI) data for the periods listed below. To verify the accuracy of the reported PI elements, the reviewed data were assessed against guidance contained in NEI 99-02, "Regulatory Assessment Indicator Guideline," Rev. 2, and the NEI Frequently Asked Questions (FAQ) list.

Occupational Radiation Safety Cornerstone

- Occupational Exposure Control Effectiveness PI

The inspectors reviewed the Occupational Exposure Control Effectiveness PI results for the Occupational Radiation Safety Cornerstone from January through December, 2004. For the assessment period, the inspectors reviewed electronic dosimeter alarm logs and licensee procedural guidance for collecting and documenting PI data.

Section 2OS1 contains additional details regarding the inspection of controls for exposure significant areas and review of related ARs. Documents reviewed are listed in the Attachment.

Public Radiation Safety Cornerstone

- Radiological Control Effluent Release Occurrences PI

The inspectors reviewed the Radiological Control Effluent Release Occurrences PI results for the Public Radiation Safety Cornerstone from January through December, 2004. For the assessment period, the inspectors reviewed cumulative and projected doses to the public and two ARs related to RETS/ODCM issues. The inspectors also reviewed licensee procedural guidance for collecting and documenting PI data. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

4OA2 Problem Identification and Resolution

a. Inspection Scope

Routine Review of ARs

To aid in the identification of repetitive equipment failures or specific human performance issues for followup, the inspectors performed frequent screenings of items entered into the licensee's CAP. The review was accomplished by reviewing daily AR reports.

The inspectors performed an in-depth annual sample review of selected ARs to verify that conditions adverse to quality were addressed in a manner that was commensurate with the safety significance of the issue. The inspectors reviewed the actions taken to verify that the licensee had adequately addressed the following attributes:

- Complete, accurate, and timely identification of the problem
- Evaluation and disposition of operability and reportability issues
- Consideration of previous failures, extent of condition, generic or common cause implications
- Prioritization and resolution of the issue commensurate with the safety significance
- Identification of the root cause and contributing causes of the problem
- Identification and implementation of corrective actions commensurate with the safety significance of the issue

The following issues and associated corrective actions were reviewed:

- AR 134802, EDG #1 tied to emergency bus E-1 prior to proper load shedding due to mispositioned hinged-armature (HGA) relay cover
- AR 135926, Potential Adverse Trend - Inappropriate Safety Class Downgrades

Enclosure

b. Findings

Introduction

A self-revealing Green non-cited (NCV) was identified for failure to identify a condition adverse to quality associated with mispositioned relay covers located on emergency bus E-1.

Description

On August 14, 2004, during Hurricane Charley, Unit 1 experienced a loss of offsite power. During the post-trip review, the licensee identified that EDG 1 improperly loaded. Several loads operating at the time of the event and receiving power from emergency bus E-1 (e.g., 1B conventional service water pump, 1A nuclear service water pump, etc.) did not properly shed from the bus prior to EDG 1 tying to the bus. An NRC Special Inspection reviewed the event and subsequent licensee actions. The results of this inspection are documented in NRC Inspection Report 05000325/2004011, dated September 26, 2004. The licensee's post-trip review determined that the cover of a General Electric HGA surface mounted relay in the E-1 switchgear had been mispositioned. The base of the relay cover was pushed into the relay base, causing the armature to be failed in the actuated state. The relay, 1-E1-AE7-CL-B, provides a confirmatory bus load shed signal to the EDG 1 output breaker. With the relay failed in the actuated state, the output breaker of EDG 1 closed prior to all of the loads on emergency bus E-1 being shed. This condition could have potentially subjected EDG 1 to an overload transient depending on the amount of loads on emergency bus E-1 when the output breaker closed. The licensee implemented a modification which removed the covers from relay 1-E1-AE7-CL-B and the redundant relay 1-E1-AE7-CL-A. Inspections were performed on all HGA surface mounted relays on emergency buses E-1 through E-4. These inspections identified 18 mispositioned relay covers (including 7 on E-1) that required additional evaluation to determine operability.

The licensee's investigation found that a modification to the relay cover sides (i.e., portions removed to accommodate wiring to the relay) made the cover more susceptible to being mispositioned. The investigation concluded that the HGA relay cover associated with relay 1-E1-AE7-CL-B was inadvertently struck or pushed during emergency bus E-1 preventive maintenance activities performed on March 29, 2004. The inspector concluded that prior opportunities to identify the condition existed during maintenance in the associated compartment on March 29 and the subsequent bus outage closeout inspection.

Analysis

The failure to promptly identify a condition adverse to quality associated with mispositioned relay covers for several General Electric HGA relays on emergency bus E-1 is greater than minor because it is associated with equipment performance and affected the functional capability of the system to respond to initiating events (Mitigating System Cornerstone). This finding resulted in relay 1-E1-AE7-CL-B, which provides a

confirmatory bus strip signal to the EDG 1 output breaker, being failed in the operated state. This caused EDG 1 to be in an inoperable condition from March 29, 2004 until the condition was discovered on August 16, 2004.

This finding was evaluated using NRC Inspection Manual Chapter (IMC) 0609, Appendix A. A Significance Determination Process (SDP) Phase 2 was performed with the exposure time for the diesel generator unavailablilty based on an engineering calculation performed by the licensee. Unavailability was determined for various initiating events and was based on EDG loading capability and bus operating loads during the time period in question. The inspectors reviewed the calculation and found that it was comprehensive and accurately reflected plant equipment operation. The 6-day unavailability was evaluated as a 3 to 30 day unavailability, and the loss of offsite power (dominant accident sequence) sheets for both units were solved. The Phase 2 sheets indicated the finding would be greater than very low safety significance (Green), and the finding was submitted for Phase 3 review. Based on the limited number of hours the EDG load rating would have been exceeded, the risk calculation determined the finding to be Green. The results were consistent with the Phase 2 review, and the lower color resulted from the Phase 3 using the exact hours.

Enforcement

10CFR50, Appendix B, Criterion XVI, requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, and deficiencies are promptly identified and corrected. Maintenance worker practices and switchgear closeout inspections failed to identify that several covers on General Electric HGAs were deficient due to being mispositioned on emergency bus E-1 following maintenance activities completed on March 29, 2004. As a result, the cover associated with relay 1-E1-AE7-CL-B, which provides a confirmatory bus strip signal to the EDG 1 output breaker, was mispositioned such that the relay was failed in the operated state. The relay remained in this condition until discovery on August 16, 2004. This condition resulted in EDG 1 being inoperable beyond the allowed outage time in TS LCO 3.8.1. Because this issue is of very low safety significance and has been entered into the licensee's CAP (AR 134802), this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: NCV 05000324,325/2005002-01, Failure to Identify Condition Adverse to Quality on Emergency Bus Relay Covers. This finding is related to the cross-cutting area of problem identification and resolution due to the failure to identify a condition adverse to quality.

4OA3 Event Follow-up

.1 (Closed) Licensee Event Report (LER) 05000324,325/2004003-00: Operation Prohibited by Technical Specifications due to Inoperable Emergency Diesel Generator.

This issue was discussed in Section 4OA2 and resulted in a Green finding and NCV. No new issues were identified in the LER. This LER is closed.

.2 (Closed) LER 05000324/2002002-00: Remote Shutdown Panel Power (RSDP) Supply Inverter Design Deficiency

a. Inspection Scope

LER 05000324/2002002-00 is associated with a design control deficiency which occurred during replacement of obsolete power supply inverters. The inspectors reviewed the LER, associated corrective action documents, design documents, related procedures and performed walkdowns of the remote shutdown panel, related electrical distribution panels and nearby equipment to assess potential impact due to electrical distribution system faults and fire scenarios. Specific documents reviewed are listed in the Attachment.

b. Findings

Introduction. A Green self-revealing NCV was identified for inadequate design controls in modification Engineering Service Request (ESR) 96-00700 which replaced obsolete inverters in Unit 1 and 2 analog trip units and the Unit 2 remote shutdown panel.

Description. The inverters were changed out between February 1997 and June 1998. ESR 96-00700 utilized the specification of the previous inverters which failed to recognize the maximum expected voltage of 280Vdc which could occur for ground loop circuits. This maximum voltage requirement was identified in dc Electrical Distribution System Design Basis Document DBD-51. The replacement inverter dc surge suppressor contained metal oxide varistors (MOVs) with a maximum continuous overvoltage rating of 170 Vdc and was incorrectly specified for a maximum of 140Vdc. Operating experience from May 2002 was a missed opportunity to identify the vulnerability. A ground fault induced fire occurred in the reactor protection system channel A2 power supply inverter dc surge suppressor on instrumentation panel XU-66 in November 2002. The resulting investigation identified that a potential fire induced ground fault on the dc electrical distribution system connected to the Unit 2 RSDP instrument power supply inverter could disable automatic and manual control of the RCIC system from the Unit 2 RSDP and additional RSDP instrumentation. Unit 1 RSDP was not affected. RCIC from the RSDP is the credited means of reactor coolant inventory control for alternate safe shutdown. Root causes of the design deficiency were the use of the inadequate original specification and the failure to incorporate critical design characteristics for voltage ratings into ESR 96-00700. Corrective actions were accomplished in AR 76146, XU-66 Inverter Failure, which included reviews, training, and implementing Engineering Change (EC) 51090 which removed the inverter dc surge suppressor circuits in December 2002.

Analysis. The deficiency associated with this issue is inadequate design control associated with replacement of the Unit 2 RSDP instrument power supply inverter which could have led to the loss of RSDP instrumentation and RCIC control under certain potential fire induced ground fault conditions. This issue is more than minor because it affected the protection against external factors (fire) attribute of the Mitigating Systems Cornerstone in that it potentially affected the availability of RCIC from the Unit 2 RSDP.

No actual severe fires requiring main control room (MCR) evacuation and use of RCIC have occurred. The finding was evaluated using NRC IMC 0609, Appendix F, Fire Protection SDP. The only risk significant fire scenario to affect a safe shutdown function would be one which would be severe enough to require MCR evacuation and simultaneously cause ground faults on the portion of the dc distribution system which could produce a high voltage condition on the Unit 2 RSDP instrumentation inverter power supply surge suppressor. Considering the design of the dc distribution system, the locations of the MCR cabinets which interfaced with the RSDP energy level of the circuits in these cabinets, the minimal interfaces between these cabinets and the MCR cable tray system, and the proximity to any significant ignition sources, the inspectors determined that there was not a credible fire which could simultaneously affect RSDP functions and be severe enough to require MCR evacuation. Given that no credible fire scenario was possible, the inspectors determined that this safe shutdown finding had low degradation since MCR functions would not be completely lost for any scenario which could cause loss of the RSDP functions. Since the safe shutdown finding had low degradation it screened as Green, very low safety significance, in Phase 1 of the SDP review.

Enforcement. 10 CFR 50 Appendix B, Criterion III, Design Control requires in part that, "Measures shall be established for selection and review for suitability of application of materials, parts, equipment, and processes that are essential to the safety-related functions of structures systems and components". ESR 96-00700, Revision 2 allowed Unit 2 remote shutdown panel instrument inverter replacement with an unsuitable replacement inverter which was not specified with adequate maximum continuous overvoltage in the dc surge suppressor to withstand potential ground fault conditions. Because this design control failure is of very low safety significance and has been entered into the CAP (AR 76146), this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000324/2005002-02, Remote Shutdown Panel Power Supply Inverter Design Deficiency.

4OA6 Meetings, Including Exit

On April 13, 2005, the resident inspectors presented the inspection results to Mr. C. J. Gannon and other members of his staff. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

G. Atkinson, Supervisor - Emergency Preparedness
J. Bates, IWE Containment Engineer
L. Beller, Supervisor - Licensing/Regulatory Programs
E. Black, NDE Level III ISI Specialist
A. Brittain, Manager - Security
T. Cleary, Director - Site Operations
D. DiCello, Manager - Nuclear Assessment
C. Elberfeld, Lead Engineer - Technical Support
J. Ferguson, Manager Environmental and Radiological Control
C. Gannon, Site Vice President
J. Gawron, Training Manager
R. Kitchen, Engineering Manager
D. Hinds, Plant General Manager
J. McIntyre, Engineering Supervisor
E. O'Neil, Manager - Site Support Services
A. Pope, Manager - Maintenance
E. Quidley, Manager - Outage and Scheduling
S. Tabor, Lead Engineer - Technical Support
K. Ward, Superintendent Technical Services
T. Ward, Maintenance Rule Engineer
M. Williams, Manager - Operations

NRC Personnel

P. Fredrickson, Chief, Reactor Projects Branch 4, Division of Reactor Projects Region II

Attachment

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Opened and Closed

05000324,325/2005002-01	NCV	Failure to Identify Condition Adverse to Quality on Emergency Bus Relay Covers (Section 4OA2)
05000324/2005002-02	NCV	Remote Shutdown Panel Power Supply Inverter Design Deficiency (Section 4OA3.2)

Closed

05000324,325/2004003-00	LER	Operation Prohibited by Technical Specifications due to Inoperable Emergency Diesel Generator (Section 4OA3.1)
05000324/2002002-00	LER	Remote Shutdown Panel Power Supply Inverter Design Deficiency (Section 4OA3.2)

Discussed

None

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

POM, Vol. III, 0OP-39, Diesel Generator Operating Procedure, Rev. 103
POM, Vol. III, 2OP-17, Residual Heat Removal System Operating Procedure, Rev. 136
0AP-022, BNP Outage Risk Management, Rev. 11
0AP-38.0, Loss of Fuel Pool Cooling, Rev. 12
Engineering Evaluation Report (EER) 93-0656, Fuel Pool Make-up for Unit #2 Refuel Outage B211R1

Section 1R05: Fire Protection

POM, Vol. XIX, 2PFP-RB, Reactor Building Prefire Plans, Rev. 6
POM Vol. XIX, 0PFP-DG, Diesel Generator Building Prefire Plans, Revision 8

Section 1R08: Inservice Inspection Activities

WO No. 00657471 03, 1-E11-34-4-300 Through Wall Leak on RHR Piping
Report No: UT-05-020, UT Calibration/Examination on Feedwater Pipe, B Loop (WO No. 598034)
Reports No.: UT-05-022, UT-05-023, UT-05-024, UT-05-025, and UT-05-026, UT Calibration/ Examination on Nozzle to Shell Weld (WO No. 598034)
Report No.: MT-05-010, Magnetic Particle Examination on Feedwater Pipe Integral Attachment, B Loop (WO 598034)
AR 00153082, IDDEAL Database not Updated to Reflect Correct NDE Certifications
AR 00148205, Spec 247-117 Revised without Adequate Code Case Justification
AR 00153060, Bulging of the 2-X-2 Personnel Airlock Penetration Sleeve

Section 1R12: Maintenance Effectiveness

Administrative Procedures

ADM-NGGC-0101, Maintenance Rule Program, Rev. 17
ADM-NGGC-0003, Conduct of Probabilistic Safety Assessment Unit Operations, Rev. 5
EGR-NGGC-0351, Condition Monitoring of Structures, Rev. 12

Miscellaneous Documents

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OAP-025, BNP Integrated Scheduling, on-line risk evaluation and work scheduling 10CFR50.65(a)(4)
Repeat Maintenance Rule Functional Failures Report, dated 2/21/05
Equipment Performance Priority List, dated 2/21/05
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MR Systems with Unavailability Criteria Report, dated 2/21/05
MR System Scoping Summary, 2/23/05
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Expert Panel Meeting Minutes for: 2/9/05, ½6/05, 11/17/04, 10/27/05, 7/14/04, 5/5/04, 4/14/04, ½1/04
Selected On-Line Week OSCRs, (Outage Scope Change Reports), dated 2/23/05
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AR 101611, MR a(3) Assessment Weakness (AR78456)
AR 101606, MR a(3) Assessment Weakness (AR78456)
AR 101617, MR a(3) Assessment Weakness (AR78456)
AR 100171, Missed MRFF Determination
AR 123106, U1 Main Steam Line 'A' Whip Restraint Found with Loose Nuts
AR 146005, MR Scoping Deficiency for System 5080

Nuclear Self-Assessments

RR-SP-02-04, Robinson and Brunswick Maintenance Rule Program Assessment, ½3/03
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Section 1R20: Refuel Outage Activities

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POM, Vol. III, Rev. 136, 2OP-17, Residual heat Removal System Operating Procedure
POM, Vol. IV, Rev. 113, 0GP-05, Unit Shutdown
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POM, Vol. IX, Rev. 17, Control Rod Shuffle
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Section 1R22: Surveillance Testing

POM Vol. XII, 0PDM-MO005C, Teledyne Smart Stem and Quick Stem Sensor Testing, Rev. 8
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SD-43, Service Water System Description
AR-154608, Anomalous indications during testing of 2-SW-V111

Section 2OS1: Access Control To Radiologically Significant Areas

Procedures, Manuals, and Guides

0E&RC-0040, Administrative Controls For High Radiation Areas, Locked High Radiation Areas, And Very High Radiation Areas, Revision (Rev.) 24
0E&RC-0100, Radiation Surveys Methods, Rev. 32
0E&RC-0111, Survey Methods For Removable Surface Contamination, Rev. 28
0E&RC-0120, Routine/ Special Airborne Radioactivity Survey, Rev. 19
0E&RC-0175, Radiological Controls For Diving Operations, Rev. 3
0E&RC-0230, Issue And Use of Radiation Work Permit, Rev. 43
0E&RC-0241, Health Physics Coverage in the Drywells During Fuel and Irradiated Component Movement, Rev. 12
0E&RC-0290, Control of Brunswick Nuclear Plant Radiography Activities, Rev. 9
DOS-NGGC-0004, Administrative Dose Limits, Rev. 7
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0AI-112, Control of Materials in Spent Fuel Pool, Rev. 15
0AI-122, Pre-job Briefings & Post-job Critiques, Rev. 8
0AI-131, Conduct of Diving Operations, Rev. 7
HPS-NGGC-0003, Radiological Posting, Labeling And Surveys, Rev. 8
HPS-NGGC-0008, Performing Work in Radiation Control Areas, Rev. 2
HPS-NGGC-0013, Personnel Contamination Monitoring, Decontamination, and Reporting, Rev. 3
HPS-NGGC-0014, Radiation Work Permits, Rev. 2
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Radiation Work Permits (RWPs)

RWP Number (No.) 2994, Management Tours / NRC Inspections/ Visitors
RWP No. 3001, Turbine - Gen. System - Inspect / Repair (B217R1) (APLAN # 2780)
RWP No. 3008, DW - Emergent / Contingent Activities (B217R1) (APLAN # N/A)
RWP No. 3012, RPV Dis/Reassembly/ Refueling/ Sipping (B217R1) (APLAN #2774)
RWP No. 3030, Refuel Floor 117' - Steam Dryer Repair (B217R1) (APLAN # 2775)
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AR 00153358, Personnel Contamination From Refuel Floor, 3/10/2005
AR 00133662, Individual's Shoes Alarmed Gamm60 Monitor at CR3, 8/02/2004
AR 00122861, Work Performed in Dry-Well Outside of HP Briefing, 3/29/2004
AR 00152982, LHRA Door Found Ajar, 3/07/2005
AR 00124499, Coat/Boots identified at North Anna Containing Radioactivity, 4/16/2004
AR 00154978, Radiation Area Posting Turned Around, 3/29/2005
AR 00154921, Contamination Found on Individual During Inprocessing at ANO, 3/29/2005
AR 00155530. Failure to Generate NCR in 2004, When the Licensee Was Notified of an Individual Arriving at Their Site with Low Level Contamination, 03/30/2005
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Survey No. 0308-006, Radiological Survey, General Area Rad Survey of U2 RB Drywell, 3/07/2005
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Pre-Dive Brief/Checklist for Dive # 41, 3/14/2005
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Section 2OS2: As Low As reasonably Achievable (ALARA) Planning and Controls

Procedures, Manuals, and Guides

ADM-NGGC-0104, Work Management Process, Rev. 28
ADM-NGGC-0105, ALARA Planning, Rev 6
ADM. 0AI, Water Chemistry Guidelines, Rev. 38
OE&RC-4101, Plant Review of Plant Modifications and EC, Rev. 3
0AI-52, ALARA Committee Activities and Responsibilities, Rev. 12
0AI-81, Water Chemistry Guidelines. Rev. 38
0E&RC-4100, ALARA Program, Rev. 08
ALARA Continuous Improvements Strategy, 2005
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EGR-NGGC-0009, Engineering Change Request, Rev 1
0E&RC-0020, Radiological Pre-Job Briefings, Rev. 1
0AI-52, ALARA Committee Activities and Responsibilities, Rev. 12

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B217 ALARA Briefing Sheet, ALARA Plan #2775, B217R1 Steam Dryer Inspections
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B217 ALARA Briefing Sheet, ALARA Plan #2757, Integrated Inspections (Rev. 1)
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B217R1 Nozzle Flush Plan, 02/09/05
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AR 00154735, Reactor Cavity Decon Problems, 03/27/2005
AR 00152834, Action Plan 2B-32-F031B Leak Repair, 03/2005
AR 00154163, U2 B17R Outage Exposure Goal 120 Person-Rem Exceeded, 03/18/2005
AR 00153517, Personnel Contamination Due To Poor Rad Worker Practices, 03/12/2005
AR 00153518. Poor Rad Worker Practices, 03/11/2005
AR 00152995, Individuals Entered The Drywell on Wrong RWP, 03/08/2005
AR 00153562, Personnel Contamination Occurrence, 03/10/2005
AR 00153563, Personnel Contamination Occurrence, 03/13/2005
AR 00154204, Personnel Contamination Occurrence, 03/20/2005
AR 00154551, Drywell Personnel Contamination 03/23/2005
AR 00154821, Personnel Contamination Occurrence, 03/28/2005
AR 00154685, Personnel Contamination Occurrence, 03/10/2005
AR 00154867, Atlantic Contract Individual Was Found Contaminated On Face After Drywell Entry, 03/28/2005
AR 00154138, Workers Shoe Contaminated While Working in a Clean Area, 03/18/2005
AR 00153987, Shoe Contaminated in Clean Area, 03/17/2005

Section 2PS2: Radioactive Material Processing and Transportation

Procedures, Manuals, and Guides

HPS-NGGC-0001, Radioactive Material Receipt and Shipping Procedure, Rev. 19
HPS-NGGC-0002, Vendor Cask Utilization Procedure, Rev. 12
DOT Specification 7A Type A Container Closure Procedure for Cromwell's Welding Fuel Inspection Tool Shipping Box
0OP-06.12, Condensate Phase Separator Operating Procedure, Rev. 40
MMT-PCP-03-003, MMT-TN Mobile Incontainer Dewatering and Solidification System Process Control Program, Rev. 0
0E&RC-0582, Handling the IF-300 Cask, Rev. 40
0AI-54, Waste Management Program, Rev. 8
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Shipping Records and Radwaste Data

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04-160, GE Inspection Tools, 11/8/04
04-010, Spent Fuel, 8/11/04
04-117, Powdered Resin, 8/5/04
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10 CFR Part 61 Radioactive Waste Stream Analysis Reports, RWCU Resin and DAW, 2003 and 2004
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AR 00154977, radioactive shipment received at Brunswick with damage to shipping van, 3/29/05
AR 00153982, contaminated skull caps found in clean trash, 3/17/05
AR 00148043, two bags of contaminated debris found at clean trash facility, 12/9/04
AR 00123667, incorrect description of valve 1-G16-F385B on plant drawings, 4/2/04
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Section 2PS3: Radiological Environmental Monitoring Program

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AR No. 00124499, Coat/Boots identified at North Anna Containing Radioactivity, 4/16/2004
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Section 4OA1: Performance Indicator Verification

Procedures

REG-NGGC-0009, NRC Performance Indicators and Monthly Operating Report Data, Rev. 4

Records

Electronic Dosimeter Alarm Logs, January, 2004 - March, 2005
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Dose Summation Report, Gaseous Effluents, 1/1/04 - 12/31/04

CAP Documents

AR 149459, NAS assessment results - poor effluent monitor reliability, ½7/05
AR 120610, continuous air sampler found out of tolerance, 3/8/04

Section 4OA3: Event Followup

Procedures

0FPP-014, Control Of Combustibles, Transient Fire Loads, and Ignition Sources
0FPP-013, Transient Fire Load Evaluation
0AOP-39.0, Loss of DC Power
0ASSD-02, Alternative Safe Shutdown Procedure - Control Building

Drawings

2-FP-50098, Unit 2 RCIC System Elementary Wiring Diagram
LL-03024, Sheet 7, 125-250 VDC System Control Building Distribution Panel 4B-H24
LL-03024, Sheet 14, 125-250 VDC System Control Building Distribution Panel 12B-HZ5

Other Documents

Licensee Event Report 05000324/2002002-00, Remote Shutdown Panel Power Supply Inverter 1 Design Deficiency
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