



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

October 28, 2005

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION
REPORT NOS. 05000325/2005004 AND 05000324/2005004, AND NOTICE OF
ENFORCEMENT DISCRETION (NOED) NO. 05-2-001

Dear Mr. Scarola:

On September 30, 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 October 13, 2005, with Mr. T. Cleary and other members of your staff, and with Mr. E. O'Neil of your staff on October 27, 2005.

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.

This report documents one NRC-identified finding and one self-revealing finding of very low safety significance (Green). One of the findings was determined to involve a violation of NRC requirements. However, because of its very low safety significance and because it had been entered into your corrective action program, the NRC is treating this finding as an additional example of a previously issued non-cited violation, in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you contest this non-cited violation example, 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, 324/2005004
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

cc w/encl:

T. P. Cleary, Director Site Operations
Brunswick Steam Electric Plant
Progress Energy Carolina, Inc.
Electronic Mail Distribution

Benjamin C. Waldrep, Plant Manager
Brunswick Steam Electric Plant
Carolina Power & Light Company
Electronic Mail Distribution

Chris Burton, Manager
Performance Evaluation and
Regulatory Affairs PEB 7
Carolina Power & Light Company
Electronic Mail Distribution

Edward T. O'Neil, Manager
Site Support Services
Brunswick Steam Electric Plant
Carolina Power & Light Company
Electronic Mail Distribution

Leonard R. Beller, Supervisor
Licensing/Regulatory Programs
Brunswick Steam Electric Plant
Carolina Power & Light Company
Electronic Mail Distribution

John H. O'Neill, Jr.
Shaw, Pittman, Potts & Trowbridge
2300 N Street NW
Washington, DC 20037-1128

Beverly O. Hall, Acting Director
Division of Radiation Protection
N. C. Department of Environment
and Natural Resources
Electronic Mail Distribution

David T. Conley
Associate General Counsel II
Legal Department
Progress Energy Service Company, LLC
Electronic Mail Distribution

Margaret A. Force
Assistant Attorney General
State of North Carolina
Electronic Mail Distribution

Jo. A. Sanford, Chair
North Carolina Utilities Commission
c/o Sam Watson, Staff Attorney
Electronic Mail Distribution

Robert P. Gruber
Executive Director
Public Staff NCUC
4326 Mail Service Center
Raleigh, NC 27699-4326

Public Service Commission
State of South Carolina
P. O. Box 11649
Columbia, SC 29211

David R. Sandifer, Chairperson
Brunswick County Board of Commissioners
P. O. Box 249
Bolivia, NC 28422

Warren Lee, Director
New Hanover County Department of
Emergency Management
P. O. Box 1525
Wilmington, NC 28402-1525

Distribution w/encl: (See page 4)

CP&L

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Distribution w/encl:

B. Mozafari, NRR

L. Slack, RII EICS

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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: 05000325/2005004 and 05000324/2005004

Licensee: Carolina Power and Light (CP&L)

Facility: Brunswick Steam Electric Plant, Units 1 & 2

Location: 8470 River Road SE
Southport, NC 28461

Dates: July 1, 2005 - September 30, 2005

Inspectors: E. DiPaolo, Senior Resident Inspector
J. Austin, Resident Inspector
S. Vias, Senior Reactor Inspector (Section 1R01 and 4OA3)
H. Gepford, Health Physicist (Section 2OS3)

Approved by: Paul Fredrickson, Chief
Reactor Projects Branch 4
Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000325/2005004, 05000324/2005004; July 1, 2005 - September 30, 2005; Brunswick Steam Electric Plant, Units 1 and 2; Problem Identification and Resolution and Other Activities.

The report covered a three-month period of inspection by resident inspectors, a region-based health physics inspector, and a region-based senior reactor inspector. One example of a previously identified Green non-cited violation and one Green finding 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 was identified for failure to properly control the emergency diesel generator control switch to assure reliability of the offsite power source to the plant's emergency buses. As a result, Brunswick Units 1 and 2 experienced a loss of power to emergency bus E-1 on May 12, 2005 when it's feeder breaker from the offsite power source opened following a voltage transient initiated by a fault on another emergency bus. The licensee entered this issue into the corrective action program.

This finding is greater than minor because it is associated with the operating equipment lineup attribute of the Mitigating Systems Cornerstone and affects the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. The finding is of very low safety significance because it did not represent an actual loss of safety function of a single train for greater than the TS allowed outage time. (Section 40A2)

- Green. An additional example of a previously issued NRC-identified non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, was identified for failure to promptly identify and correct the cause of an emergency diesel generator (EDG) differential overcurrent lockout. The inadequately set differential overcurrent relays ultimately resulted in all 4 EDGs being declared inoperable and a subsequent shutdown of both operating units. In addition, several past EDG differential overcurrent lockouts provided opportunities to identify and correct the cause of the lockout.

The finding is greater than minor because it is associated with the reactor safety cornerstone of Mitigating Systems because the equipment performance attribute of the onsite emergency power was affected. It affected the objective of reliability of systems which respond to initiating events. This finding is of very low safety significance as determined by the Significance Determination Process

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because the performance deficiency did not have a major impact on EDG performance as demonstrated by actual EDG start data. This finding involved the crosscutting aspect of problem identification and resolution in that it involved a failure to adequately evaluate a potential significant problem on at least three separate occasions. (Section 4OA5.2)

B. Licensee Identified Violations

None

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REPORT DETAILS

Summary of Plant Status

Unit 1 began the report period operating at full power. On July 13, Unit 1 experienced an automatic reactor scram in response to the failure of the generator output no-load disconnect (B phase). Following the implementation of a temporary modification to the disconnect, the unit entered Mode 2 (Startup) on July 19 and achieved full power on July 22. On August 5, Unit 1 commenced a Technical Specification required shutdown in response to declaring all (4) site emergency diesel generators inoperable. Mode 4 (Cold Shutdown) was achieved on August 6. Following evaluations and modifications to the site's emergency diesel generators which returned them to an operable status, Unit 1 entered Mode 2 on August 10. Full power was achieved on August 13. On August 21, the unit performed an unplanned downpower to approximately 54 percent due to the trip of the B recirculation pump caused by an invalid actuation of a motor-generator high temperature switch. The actuation was determined to be initiated by an offsite power voltage transient caused by area adverse weather (i.e., lightning). The unit restored the recirculation pump to operation and returned to full power on August 22. Full power was maintained for the remainder of the inspection period.

Unit 2 began the report period operating at full power. Similar to Unit 1, Unit 2 commenced a shutdown in response to declaring all site emergency diesel generators inoperable on August 5. Mode 4 (Cold Shutdown) was achieved on August 6. Following the restoration of the site's emergency diesel generators to an operable status and the implementation of a temporary modification to the generator output no-load disconnect, Unit 2 entered Mode 2 on August 11. Full power was achieved on August 16. The unit commenced a planned downpower on August 19 to approximately 65 percent to facilitate fuel leak suppression testing. Following successfully locating the leaking fuel assembly, the unit returned to full power on August 23. On September 14, Unit 2 performed an unplanned downpower to approximately 60 percent in preparation for shutdown per plant emergency procedures in response to initial weather reports that hurricane force winds would be experienced on site during the approach of Hurricane Ophelia. However, due to a shift in the projected path of the storm, the shutdown was secured and the unit returned to full power later that day. Full power was maintained for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

During the approach of Hurricane Ophelia to the Cape Fear Region of North Carolina, the inspectors attended hurricane preparation status meetings, reviewed site preparations for adverse weather, and reviewed preparations for plant damage assessment. The inspectors toured risk-significant and susceptible plant areas to verify the implementation of adverse weather preparation procedures and compensatory measures before the onset of adverse weather conditions. From September 12 until September 15, 2005, the inspectors observed the licensee's emergency response

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facility staff's monitoring of storm conditions, damage assessment, emergency response capabilities, and corrective actions as a result of Hurricane Ophelia. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

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 configuration control program. Documents reviewed are listed in the Attachment.

- Emergency diesel generator (EDG) #3 when EDG #4 was OOS on July 29, 2005
- Units 1 and 2 offsite power with all site EDG's inoperable on August 6, 2005
- Unit 1 high pressure coolant injection system during troubleshooting of the A electro-hydraulic control system pressure regulator on September 30, 2005

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following action requests (ARs):

- AR 162643, Water in the Unit 1 main control room back panels
- AR 167310, Unplanned limiting condition for operation due to ultimate heat sink high temperature
- AR 167699, Unplanned limiting condition for operation due to containment atmospheric dilution tank relief valve lifting

Complete System Walkdown

The inspectors conducted a detailed review of the alignment and condition of the EDG system (system 5095). The inspector reviewed the Updated Final Safety Analysis Report (UFSAR) , associated attachments of Operating Procedure OOP-39, Diesel Generator Operating Procedure, and the system diagrams (Drawings F-09348, LL-9112, and F-03161) in determining correct system lineup. The inspectors also reviewed maintenance history of the system. Documents reviewed are listed in the Attachment.

To assess the licensee's identification and resolutions of problems, the inspectors reviewed the following ARs:

- AR 165765, Excitation potential transformers supplying loads greater than nameplate rating
- AR 165123, EDG #3 collector ring and brush inspection
- AR 165042, EDG #4 locked out on startup

b. Findings

No findings of significance were identified.

1R05 Fire Protection

a. Inspection Scope

Fire Area Walkdowns

The inspectors reviewed ARs and work orders (WOs) associated with the fire suppression system to confirm that their disposition was in accordance with Procedure OAP-033, Fire Protection Program Manual. 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. 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. Documents reviewed are listed in the Attachment.

- EDG fuel cells, -1' 6" elevation (1 area)
- EDG building switchgear rooms E-5, E-6, E-7, E-8, 23' elevation (4 areas)
- EDG building switchgear rooms E-1, E-2, E-3, E-4, 50" elevation (4 areas)

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures

a. Inspection Scope

Internal Flooding

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 Units 1 and 2 reactor buildings, the inspectors reviewed 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 was inspected for the core spray pump rooms, residual heat removal pump rooms, and the high pressure coolant injection pump rooms. 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. Documents reviewed are listed in the Attachment.

External Flooding

The inspectors reviewed the licensee's external flooding analysis as described in UFSAR Section 3.4.1, Protection from External Flooding, to determine the external flood control design features. Walkdowns were conducted to inspect the external flood protection barriers including watertight doors, curbs, sealing of external building penetrations below flood line, and the sump pumps and level alarm circuits. Areas reviewed included the fire pump building, the EDG 4-day fuel oil tanks vaults, and the nuclear service water building. Procedures for coping with external flooding were reviewed and the inspectors walked down the portable flood protection equipment listed in Procedure 0AI-68, Brunswick Nuclear Plant Response to Severe Weather Warnings. Documents reviewed are listed in the Attachment.

To assess the licensee's ability to identify and correct conditions adverse to quality, the inspectors reviewed the following ARs:

- AR 171843, Potential fire pump vulnerability during design basis flooding
- AR 169220, Inability of storm drain system to maintain basin level
- AR 170277, Faulty storm drain basin level switches

b. Findings

No findings of significance were identified.

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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 training cycle 2005-04. The simulator observations and review included evaluations of emergency operating procedure and abnormal operating procedure utilization. The inspectors reviewed Procedure OTHP-200, Licensed Operator Continuing Training (LOCT) Program, to verify that the program ensures safe power plant operation. Simulator training sessions were observed on September 7 and September 8, 2005. The scenarios observed tested the operators' ability to respond to a loss of coolant accident with failures of emergency core cooling systems necessitating alternate emergency depressurization, and an anticipated transient without scram. 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 Technical Specification (TS) actions, regulatory reports, and notifications, were observed. The inspectors assessed whether appropriate feedback was planned to be provided to the licensed operators.

b. Findings

No findings of significance were identified.

1R12 Routine Maintenance Effectiveness

a. Inspection Scope

For the equipment issues described in the ARs listed below, the inspectors reviewed the licensee's implementation of the Maintenance Rule (10 CFR 50.65) with respect to the characterization of failures, the appropriateness of the associated Maintenance Rule 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, if 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 documented in the ARs listed below to verify that the licensee had identified and resolved deficiencies in accordance with Procedure CAP-NGGC-0200, Corrective Action.

- AR 163538, Unit 1 reactor scram due to failure of the main generator no-load disconnect switch
- AR 165123, EDG#3 exciter collector ring and brush inspection

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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 10 CFR 50.65 (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 unforeseen 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 maintenance WO's for the following five conditions involving OOS equipment described below:

- Unit 1 control rod 26-43 discovered to be uncoupled as described in AR 164025 (emergent)
- EDG #4 locked out on startup on differential overcurrent and was unavailable on July 29, 2005 as described in AR 165042 (emergent)
- Outage risk condition Red due to all EDG's inoperable on August 8, 2005 (emergent)
- Unit 1 A electro-hydraulic pressure regulator taken OOS due to pressure setpoint drift on September 5, 2005 as described in AR 167995 (emergent)
- EDG#3 exciter collector ring and brush inspection as described in AR 165123 (emergent)

To assess the licensee's ability to identify, evaluate, and correct problems, the inspectors reviewed AR 165853 which documents a Unit 2 fuel failure.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors observed the following three transients and/or abnormal plant conditions to assess operator performance during non-routine evolutions and events. Operator logs, plant computer data, and associated operator actions were reviewed as well as the procedures listed in the Attachment.

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- Units 1 and 2 dual unit shutdown due to all site EDG's inoperable on August 6, 2005
- Unit 1 power ascension and Unit 2 startup preparations on August 11, 2005 following startup from dual unit shutdown
- Units 1 and 2 operation during Hurricane Ophelia including DC bus ground hunting and Unit 2 power ascension on September 14, 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 documented in the ARs 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 163345, high particulate discovered in seven day fuel or one storage tank fuel following tank ultrasonic testing.
- AR 165765, overloading condition discovered on EDG exciter potential transformers
- AR 165988, low resistance readings on EDG exciter collector rings
- AR 167147, service water discharge line through wall leak due to erosion
- AR 165129, failure of the main stack flow measurement device
- AR 162920, Unit 1 B standby liquid control pump discharge piping found to be slightly voided

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following ARs:

- AR 167802, EDG #4 shutdown interlock valve found continuously venting air
- AR 166574, Volt meter disagreement while synchronizing EDG #2 during surveillance testing
- AR 168470, Unusual noise during Unit 2 reactor core isolation cooling pump operation

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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 review was to evaluate 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 00I-01.08, Control of Equipment and System Status and held discussions with operations personnel related to the OWA's reviewed.

The inspectors reviewed an OWA associated with a temporary modification which replaced the generator output no-load disconnect with fixed links (EC 61697). In particular, the inspectors reviewed the staffing requirements and compensatory measures to assure backfeed power from the unit auxiliary transformer could be accomplished within a 1-hour committed time requirement. During the review of the OWA the inspector reviewed Carolina Power and Light letter to NRC dated September 30, 1994, Electric Distribution System Enhancements.

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 work-arounds on each individual operator watch station were also reviewed.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

For the six 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

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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 737319, 7-Day fuel oil storage tank ultrasonic testing
- WO 743322, EDG #4 Phase differential relay replacement
- WO 743327, EDG #3 Phase differential relay replacement
- WO 739769, EDG #3 Clean brushes and collector rings
- WO 555181, Engine-driven fire pump testing following maintenance
- WO 207270, Unit 1 A standby liquid control pump test following maintenance in test valve 2-C41-F016

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.

- OPT-02.3.1, Reactor Building to Suppression Chamber Vacuum Breaker and Valve Operability Test, performed on Unit 2
- 0ERC1010, Fuel Oil Sampling, performed on 7-day fuel oil tank
- OP-39 Section 8.10 start and load EDG #2
- OPT-12.3.2.b, No. 2 Diesel Generator Starting Air Valve Operability Test
- 2PT-24.1.2, Service Water Pump and Discharge Valve Operability Test

To assess the licensee's ability to identify and correct problems, the inspectors reviewed the following ARs:

- AR 166367, High pressure coolant injection system steam supply valve 2-E41-F001 stroke time was above acceptance range
- AR 162710, Unit 1 reactor core isolation cooling system minimum flow valve failed open during testing

Inservice Surveillance Testing

The inspectors reviewed the performance of Periodic Test OPT-25.1, Nuclear Steam Supply System Main Steam and Feedwater Isolation Valve Operability Test, performed

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on Unit 1. 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.

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.

- 2 ENP 63.1, Configuration of the U2 Turbine Building Ventilation System for Test of Once Through Operation, Rev. 6
- Engineering Change (EC) 61697, Temporary Replacement for Unit 1 Generator No Load Disconnect Switch

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed two site emergency preparedness training drills/simulator scenarios conducted on July 28 and September 22, 2005. The inspectors reviewed drill scenario narratives to identify the timing and location of classifications, notifications, and protective action recommendations (PARs) development activities. The inspectors evaluated the drills' conduct from the control room simulator, technical support center, and the emergency operations facility. During the drills, the inspectors assessed the adequacy of event classification and notification activities. The inspectors observed portions of the licensee's post-drill critiques at the technical support center and

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emergency operating facility. The inspectors verified that the licensee properly evaluated the drill's performance with respect to performance indicators and assessed drill performance with respect to drill objectives. To assess the ability of the licensee to identify and correct problems, the inspectors reviewed the associated emergency response organization team training drill critique reports.

b. Findings

No findings of significance were identified.

2. **RADIATION SAFETY**

Cornerstone: Occupational Radiation Safety

2OS3 **Radiation Monitoring Instrumentation and Protective Equipment**

a. Inspection Scope

Portable Radiation Monitoring Instrumentation

During the week of August 1, 2005, the inspectors evaluated completion and adequacy of radiation survey instrument calibrations performed by the licensee's central calibration facility located at the Shearon Harris Nuclear Plant. Availability of portable instruments for licensee use was evaluated through discussion with licensee personnel regarding inventory, logistics, and transfer/receipt of instruments. Calibration data for portable instruments staged or recently used for coverage of field tasks were reviewed. Records associated with the annual certifications of the gamma irradiator and neutron source used for performing calibrations and routine response checks were reviewed in detail. In addition, the inspectors observed the calibration facility for neutron instrument calibrations and discussed its adequacy for performing instrument calibrations with cognizant licensee personnel. The inspectors discussed techniques and technical bases applied to the calibration of portable survey instruments, including the use of a 25% grace period, with licensee personnel. Two corrective action program (CAP) nuclear condition documents associated with the instrument calibration activities were reviewed and discussed with responsible licensee representatives.

Operability, reliability, and calibration of selected radiation detection instruments were reviewed against 10 CFR Part 20; UFSAR Chapter 12; ANSI N323-1978, Radiation Protection Instrumentation Test and Calibration; and applicable licensee procedures. The licensee's ability to characterize, prioritize, and resolve the identified CAP issues were reviewed against CAP-0200, Corrective Action Program, Rev. 14 and associated guideline documents. **Documents reviewed during the inspection are listed in the Attachment.**

b. Findings

No findings of significance were identified.

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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 AR 158668, "Emergency bus E-1 de-energized when EDG #1 was out-of-service", to determine 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

b. Findings

Introduction.

A Green self-revealing finding was identified for failure to properly control of the EDG control switch to assure reliability of the offsite power source to the plant's emergency buses.

Description.

At 0411 on May 12, 2005, power was lost to emergency bus E-1 when it's feeder breaker from the offsite power source opened with the associated EDG out-of-service due to planned maintenance. Without power available to bus E-1, the drywell floor drain sump flow monitoring system, and the primary containment atmosphere and primary containment atmospheric gaseous RCS leakage monitoring systems were rendered inoperable. This was primarily the result of closure of the containment isolation valves associated with the systems and the inability to reopen the valves due to the inoperable E-1 bus.

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The cause of the E-1 feeder breaker opening was determined to be due to a voltage transient on the plant's 4160v buses. The transient was initiated by a fault on the supply line to a motor-driven fire pump (normally in standby) powered from emergency bus E-2. Emergency buses E-1 and E-2 are normally supplied by the Unit 1 unit auxiliary transformer (UAT). The fault was of sufficient magnitude to reduce voltage at the output of the Unit 1 UAT prior to the motor-driven fire pump breaker terminating the fault. The induced voltage transient on bus E-1 was of sufficient magnitude to actuate the E-1 undervoltage peaking relay 27PK. The 27PK relay was designed to open the balance of plant feeder breakers (master and slave) to the emergency bus when an undervoltage condition is sensed in order to protect the associated emergency bus' EDG when operating in parallel with offsite power (e.g., during testing). Thus, the emergency bus 27PK relay is only in service when the associated EDG control switch is selected to manual. Because the 27PK relay is designed to protect an operating EDG, its setpoint is more conservative than the undervoltage and degraded voltage relays associated with a loss of offsite power.

During the performance of the maintenance on the associated emergency E-1 bus EDG on May 12, 2005, the EDG control switch was in manual where it had been following a maintenance run on the evening of May 11. As a result, emergency bus E-1 lost all power when the undervoltage condition was sensed by the 27PK relay.

The licensee's root cause attributed the loss of power to bus E-1 to a design feature, associated with the EDG control logic, that can result in the reduced reliability of the offsite power source to the plant's 4160v emergency buses with the EDG control switch in manual. Plant operators and engineers were not aware of the decreased reliability of the offsite power source when the plant was in this alignment. As an immediate corrective action, Operations issued a standing instruction which directed that loss of power instrumentation, discussed in TS 3.3.8.1, be declared inoperable whenever an EDG control switch is placed in manual. Long-term corrective actions include implementing a design change to provide needed protection yet not be susceptible to losing the normal power source to emergency buses during EDG operation in manual mode.

Analysis.

The failure to properly control the EDG control switch to assure reliability of the offsite power source to the plant's emergency buses is greater than minor because it is associated with the operating equipment lineup attribute of the Mitigating Systems Cornerstone and affects the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. The finding was considered to have very low safety significance (Green) because it did not represent an actual loss of safety function of a single train for greater than the TS allowed outage time. The licensee entered this issue into the CAP as AR 158668.

Enforcement.

No violation of regulatory requirements occurred.

Enclosure

4OA3 Event Follow-up

.1 Site Emergency Diesel Generators Declared Inoperable

The inspectors observed management meetings associated with operability of the site's four EDG's when EDG #4 and EDG #2 locked out on differential overcurrent following startup on July 28, 2005 and August 5, 2005. The inspectors reviewed NRC Management Directive 8.3, NRC Incident Investigation Program, and communicated details regarding the event to NRC Management. Based on the circumstances of the event and using the criteria established in NRC Management Directive 8.3, the NRC initiated a Special Inspection. The inspection was chartered to inspect and assess the circumstances associated with the EDG lockouts. The inspection was performed August 9-12, 2005. Results of this Special Inspection documented in NRC Inspection Report 05000325,324/2005010, dated September 15, 2005.

.2 Hurricane Ophelia

a. Inspection Scope

The inspectors reviewed the licensee's actions in response to a declaration of an Unusual Event on September 12, 2005 due to the approach of Hurricane Ophelia to the Cape Fear Region of North Carolina. The inspectors observed the staffing of the emergency response organization at the technical support center, emergency operating facility, and operations support center. During the period of high wind and precipitation, the inspectors reviewed licensee actions in response to emergent equipment issues to verify that they were commensurate with the potential safety significance. Following the passing of the storm, the inspectors reviewed the licensee's damage assessment activities, coordination with state and local officials to verify adequate evacuation routes, and actions to assure proper staffing in order to assess proper continued emergency response capability.

b. Findings

No findings of significance were identified.

.3 (Closed) LER 05000325/2004002: Manual Reactor Shutdown During Loss of Offsite Power Event.

A loss of offsite power occurred on August 14, 2004, due to a fault on the Weatherspoon 230kV transmission line and the subsequent failure of a power circuit breaker (PCB 24B) associated with the transmission line. The failures occurred during a period of high winds associated with Hurricane Charley. A Special Inspection was performed to review aspects of the event. Results of the inspection are documented in NRC Inspection Report 05000325/2004011, dated September 26, 2004.

Enclosure

Additionally, NRC Inspection Report 05000325,324/2005002, dated April 29, 2005 closed out LER 05000324,325/2004003 associated with EDG #1 improperly loading during the loss of offsite power event. No additional issues were identified by the LER. This LER is closed.

.4 (Closed) LER 05000325,324/2005004: Loss of Electrical Power to Emergency Bus E1.

The details of this event were discussed in NRC Inspector Report 0050325,324/2005002 and resulted in URI 0050325/2005003-01, Notification of Enforcement Discretion (NOED) for Reactor Coolant System Leakage Detection Instrumentation. This issue is also discussed in Section 4OA2, and resulted in a Green finding. No additional issues were identified by the LER. This LER is closed.

.5 (Closed) LER 05000325/2005005: Automatic Reactor Protection System Actuation Due to No Load Disconnect Switch Failure.

An automatic reactor scram occurred on July 19, 2005 as a result of the failure of the B phase of the main generator no load disconnect switch (NLDS). Plant systems responded per design.

The NLDS was installed in 1994 to reduce the time necessary to establish unit auxiliary transformer backfeed to insure compliance with General Design Criteria 17. Design modifications to implement extended power uprate on both Units reevaluated the acceptability of the NLDS at uprated conditions. This evaluation was prepared by the vendor that originally designed and supplied the NLDS. The evaluation report concluded that the NLDS would be acceptable with a new higher airflow cooling system which was also installed for extended power uprate.

Subsequent to the NLDS failure, the licensee's investigation determined that the root cause was inadequate design and testing of the NLDS by the vendor resulting in the NLDS not meeting its nameplate design rating (25,000 amps). A temporary modification was installed on both Unit 1 and Unit 2 which replaced the NLDSs with removable bus bars. The licensee confirmed that time commitments to satisfy backfeed operation would be met with the temporary modifications. The licensee plans to make permanent modification corrective actions. The inspector reviewed the licensee's root cause analysis and determined that no performance deficiency existed because the cause was not reasonably within the licensee's ability to foresee and correct the design inadequacy. This LER is closed.

4OA5 Other Activities

.1 (Closed) URI 050325/2005003-01: Notification of Enforcement Discretion (NOED) for Reactor Coolant System Leakage Detection Instrumentation (NOED No. 05-2-001).

On May 12, 2005, the NRC orally granted a Unit 1 NOED (No. 05-2-001) in accordance with IMC 9900, Technical Guidance, Operations-Notices of Enforcement Discretion, related to enforcing compliance with the requirements of TS 3.4.5, RCS Leakage

Enclosure

Detection Instrumentation. The details of the failure and the request was documented in a letter dated May 13, 2005, from the licensee to the NRC, with written approval, granting the NOED provided in a letter dated May 17, 2005. This URI was identified to review the causes that may have led to the need for the NOED and to determine whether any Enforcement Actions were warranted per Inspection Manual Chapter 9900. The review of the licensee's root cause analysis is discussed in Section 4OA2 and resulted in a Green finding. This URI is closed.

.2 (Closed) URI 05000325, 324/2005010-01: Failure to Identify a Vulnerability to Spurious Tripping of EDG During the Start Sequence.

On August 5, 2005, all site emergency diesel generators were declared inoperable due to the lockout of two EDGs shortly after startup. An NRC Special Inspection reviewed the issues surrounding the event. During the Special Inspection, the inspectors identified that prior opportunities existed to identify the cause for the lockouts. This URI was identified pending final determination of the safety significance of the finding and review of the completed root cause analysis of the event. At the time of issuance of NRC Inspection Report 05000325, 324/2005010, dated September 15, 2005, the licensee's root cause analysis had not been finalized.

The inspectors reviewed the licensee's approved root cause analysis and corrective actions as documented in AR 165042. The analysis concluded that the root cause was installation of the EDG 87DP differential overcurrent relay installed in 1982 which had a fixed minimum pickup setpoint lower than the previous relay. The setpoint of the relay was only slightly higher than the normal no-load current which is essentially the current to the exciter/regulator. This cause was already identified at the time of the Special Inspection. The final root cause analysis refined the conclusion that the spurious actuation of the EDG 87DP relay occurred due to the lack of setpoint margin only when minor abnormal perturbations were present in the exciter/regulator under no-load operation. As stated in NRC Inspection Report 05000325, 324/2005010, the licensee missed three opportunities to identify this problem which was the basis for the performance deficiency. The licensee performed a modification which replaced the existing relay and raised the setpoint of the differential overcurrent lockout. The inspectors concluded that the corrective actions identified were adequate to address the causes and contributing causes stated in the root cause analysis.

The failure to promptly identify a problem affecting EDG reliability after multiple and documented opportunities is a performance deficiency. The finding is more than minor because it is associated with the reactor safety cornerstone of Mitigating Systems by virtue of the fact that the equipment performance attribute of the onsite emergency power was affected. It affected the objective of reliability of systems which respond to initiating events. A NRC Significance Determination Process (SDP) Phase 1 evaluation determined the finding resulted in a loss of the safety function of the EDG, requiring a Phase 2 analysis. An SDP Phase 2 evaluation was performed after review of the approved root cause analysis report.

Enclosure

Safety significance of the performance deficiency from Phase 2 was determined by considering the actual cause of the EDG lockout. The setpoint for the 87DP relay was, or very close to, the actual normal operating current at the no-load mode of operation. During loss-of-offsite power events, the 87DP relay could spuriously operate during startup of the EDG, preventing the EDG from successfully connecting to the emergency bus. Actual plant EDG startup reliability data over the years since the condition existed (1982) was evaluated to determine the failure rate used to model this problem in the site-specific SDP work sheets. This data showed that the reliability for starting and running was 99 percent. Since the data supported the conclusion that the performance deficiency did not have a major impact on EDG performance, but would sometimes manifest itself under certain conditions during the period between EDG start and the output breaker closing, the problem was evaluated using the Phase 2 work sheet for loss of offsite power. The SDP worksheet was evaluated with the values representing failure probability of emergency power unchanged, but used those sequences in the solution. Because of the construction of the SDP sheets, this effectively analyzed a doubling of the EDG failure rate, which based on the actual EDG failure data, was very conservative. The result of this evaluation was that the risk significance of the performance deficiency was of very low safety significance (Green). This finding involved the crosscutting aspect of problem identification and resolution in that it involved a failure to adequately evaluate a potential significant problem on at least three separate occasions.

10 CFR 50, Appendix B, Criterion XVI, Corrective Action, requires that measures shall be established to assure that conditions adverse to quality such as deficiencies be promptly identified and corrected. Contrary to this requirement, the inadequate EDG differential overcurrent relay setting, a condition adverse to quality affecting EDG reliability, was not identified and corrected after multiple documented opportunities to do so. Because this violation is of very low safety significance and has been entered into the licensee's corrective action program (AR 165042), this NRC-identified violation is being treated as an additional example of NCV 05000325,324/2005010-02, Failure to Generate an A/R for Abnormal Conditions Identified in Work Orders [/ Failure to Identify a Vulnerability to Spurious Tripping of EDG During the Start Sequence], consistent with Section VI.A of the NRC Enforcement Policy. Based on URI 05000325,324/2005010-01 being resolved, it is now closed.

.3 Operational Readiness of Offsite Power (Temporary Instruction (TI) 2515/163)

Completion of this TI was documented in NRC Inspection Reports 05000325, 324/2005003. However, after an NRC headquarters review of the data provided, additional information related to the TI was requested. The inspectors collected this information from licensee discussions, site procedures and licensee documentation. The information was subsequently provided to the headquarters staff for further analysis.

Enclosure

4OA6 Meetings, Including Exit

On October 13, 2005, the resident inspectors presented the inspection results to Mr. T.P. Cleary and other members of his staff. In addition a supplemental exit was conducted with Mr. E. O'Neil on October 27, 2005. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

G. Atkinson, Supervisor - Emergency Preparedness
L. Beller, Supervisor - Licensing/Regulatory Programs
A. Brittain, Manager - Security
T. Cleary, Director - Site Operations
D. DiCello, Manager - Maintenance
C. Elberfeld, Lead Engineer - Technical Support
C. Gannon, Site Vice President
J. Gawron, Training Manager
R. Kitchen, Engineering Manager
G. Miller, Lead Engineer - Technical Support
E. O'Neil, Manager - Site Support Services
A. Pope, Manager - Operations
E. Quidley, Manager - Outage and Scheduling
M. Turkal, Lead Engineer - Technical Support
M. Williams, Manager - Operations Support
B. Waldrep, Plant General Manager

NRC Personnel

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

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

NONE

Opened and Closed

05000325, 324/2005010-02	Example of NCV	Additional Example of Failure to Generate an A/R for Abnormal Conditions Identified in Work Orders [/ Failure to Identify a Vulnerability to Spurious Tripping of EDG During the Start Sequence]. (Section 4OA5.2)
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Closed

05000325/2004002	LER	Manual Reactor Shutdown During Loss of Offsite Power Event (Section 4OA3.3)
05000325/2005003-01	URI	NOED for Reactor Coolant System Leakage Detection Instrumentation (Section 4OA5.1)
05000325,324/2005004	LER	Loss of Electrical Power to Emergency Bus E1 (Section 4OA3.4)
05000325/2005005	LER	Automatic Reactor Protection System Actuation Due to No Load Disconnect Switch Failure (Section 4OA3.5)
05000325, 324/2005010-01	URI	Failure to Identify a Vulnerability to Spurious Tripping of EDG During the Start Sequence.(Section 4OA5.2)

Discussed

NONE

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Plant Operating Manual (POM), Volume XIII, Plant Emergency Procedure (PEP) 0PEP-02.1, Initial Emergency Actions, Rev. 48

POM, Volume XIII, 0PEP-02.6, Severe Weather, Rev. 9

POM, Volume I, Book 2, Administrative Instruction (AI) 0AI-68, Brunswick Nuclear Plant Response to Severe Weather Warnings, Rev. 24

POM, Volume XXI, Abnormal Operating Procedure (AOP) 0AOP-13.0, Operation During Hurricane, Flood Conditions, Tornado, or Earthquake

Section 1R04: Equipment Alignment

WO 739769, Perform Brush and Collector Ring Inspections and Cleaning on DG #3

WO 742240, Replace DG #2 Phase B Differential Relay

WO 739649, Replace DG #4 Phase C Differential Relay

WO 741746, Collect Data for DG #4 Trip Root Cause

POM Volume III, Operating Procedure 0OP-39, Diesel Generator Operating Procedure, Rev. 104

POM Volume III, Operating Procedure 1OP-19, High Pressure Coolant Injection System Operating Procedure, Rev. 61

Section 1R05: Fire Protection

POM Volume XIX, Prefire Plan 0FPF-DG, Diesel Generator Building Prefire Plans, Rev. 8

Section 1R06: Flood Protection Measures

POM, Volume XXI, Abnormal Operating Procedure (AOP) 0AOP-13.0, Operation During Hurricane, Flood Conditions, Tornado, or Earthquake

POM, Volume X, Periodic Test (PT) 0PT-34.2.2.1, Fire Door, ASSD Access/Egress Door, Severe Weather Door Inspections, Rev. 30

Updated Final Safety Analysis Report Chapters 2 and 3

Section 1R14: Operator Performance During Non-Routine Evolutions and Events

POM, Volume IV, General Plant Operating Procedure 0GP-03, Unit Startup and Synchronization, Rev. 64

POM, Volume IV, General Plant Operating Procedure 0GP-05, Unit Shutdown, Rev. 117

Section 2OS3: Radiation Monitoring Instrumentation and Protective Equipment

Procedures and Technical Documents

ERC-114, Control of Radiation Instruments and Equipment, Rev. 6

HPS-0005, Calibration of Portable Radiation and Contamination, Rev. 5

HPS-0009, Operation of Radiation & Contamination Survey Instruments, Rev. 2

HPS-0011, Cs-137 Calibration Source Standardization, Rev. 2
SIC-700, Operation and Certification of Calibration Standards, Rev. 9
Radiation Protection Technical Note 04-001, Use of a "Grace Period" for Calibrations, Rev. 0,

Corrective Action Program (CAP) Documents

Nuclear Condition Report (AR) 127084, Instrument Source Check, 5/15/04
AR 67211, Calibration Performed with Source not Traceable to NBS, 7/26/02

Data and Records Reviewed

Certificates of Calibration for Calibration Sources: 03-021B, 00-068, 00-072B, 00-072A, 86-001, 98-003, 99-052
Neutron Calibration Source Certification Data Sheet, 7/11/05
Shepherd Model 89 Recertification Spreadsheet, 2/22/05