



UNITED STATES
NUCLEAR REGULATORY COMMISSION

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

October 29, 2007

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT - NRC INTEGRATED INSPECTION
REPORT NOS. 05000325/2007004 AND 05000324/2007004

Dear Mr. Scarola:

On September 30, 2007, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Brunswick Unit 1 and 2 facilities. The enclosed integrated inspection report documents the inspection findings, which were discussed on October 29, 2007, with you and other members of your staff.

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

Based on the results of this inspection, a self-revealing finding of very low safety significance (Green) was identified. The finding was determined to involve violations of NRC requirements. However, because of the very low safety significance and because it was entered into your corrective action program, the NRC is treating this finding as a non-cited violation (NCV), in accordance with Section VI.A.1 of the NRC's Enforcement Policy. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. If you contest these non-cited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator Region II; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Brunswick Steam Electric Plant.

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

Sincerely,

/RA/

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

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

Enclosure: Inspection Report 05000325, 324/2007004
w/Attachment: Supplemental Information

cc w/encl: (See page 3)

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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: 05000325/2007004 and 05000324/2007004

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, 2007 - September 30, 2007

Inspectors: E. DiPaolo, Senior Resident Inspector
J. Austin, Senior Resident Inspector
S. Rutledge, Acting Resident Inspector
G. Kuzo, Senior Health Physicist
L. Garner, Senior Project Engineer

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

Enclosure

SUMMARY OF FINDINGS

IR 05000325/2007004, 05000324/2007004; 07/01/07 - 09/30/07; Brunswick Steam Electric Plant, Units 1 and 2; Surveillance Testing.

The report covered a 3-month period of inspection by resident inspectors. One self-revealing Green non-cited violation (NCV) was identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green A self-revealing Green non-cited violation (NCV) of Technical Specification 5.4.1 was identified for failure to follow the Diesel Generator monthly load test procedure (OPT-12.2D) which resulted in Diesel Generator number 4 tripping on reverse power and locking out. This issue was entered into the corrective action program for resolution.

The finding was more than minor because it was associated with the equipment performance attribute of the mitigating system cornerstone objective of ensuring the availability of systems that respond to initiating events. The finding was assessed using the Significance Determination process and determined to be of very low safety significance (Green) because it did not contribute to a loss of the Diesel Generator safety function for greater than its technical specification allowed time. This finding was related to the human performance and error prevention aspect of the crosscutting area of human performance because the Diesel Generator tripping on reverse power and locking out was the result of a human error due to the failure to properly use self and peer checks (H.4.a). (Section 1R22)

B. Licensee-Identified Violations

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

Enclosure

REPORT DETAILS

Summary of Plant Status

Unit 1

Unit 1 began the inspection period operating at full power. Power was reduced to approximately 73 percent on July 29 to facilitate main turbine valve testing and to perform a control rod improvement. The unit was returned to full power later that day. On August 7, power was reduced to approximately 30 percent as a result of the Unit 1 A recirculation pump motor-generator set tripping. Following repairs to the motor-generator excitation circuit, normal two-loop operation was restored on August 8, and full power was achieved. Power was reduced to approximately 87 percent on August 9 for control rod testing. The unit was returned to full power on August 10. On August 18, power was reduced to approximately 89 percent to swap the 1B condensate booster pump due to a high vibration. Full power was achieved later that day. On August 24, power was reduced to approximately 90 percent to perform a control rod improvement. Full power was achieved later that day. On September 7, a power reduction and unit shutdown (B116F3) was performed due to foreign material search and recovery in vital systems. On September 20, a power ascension was commenced following the shutdown. Full power was achieved on September 23. On September 23, power was reduced to approximately 81 percent to perform a control rod improvement. Full power was restored on September 25. The unit remained at full power for the remainder of the inspection period.

Unit 2

Unit 2 began the inspection period operating at full power. On July 1, power was reduced to approximately 85 percent for a rod pattern adjustment. Full power was restored later that day. On September 13, power was reduced to approximately 69 percent to support a rod sequence exchange. Power was returned to full on September 14. On September 28 power was reduced to approximately 60 percent to perform scheduled maintenance on the reactor feed pumps. Full power was restored on October 1, 2007.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection

a. Inspection Scope

During the approach of Tropical Storm Gabrielle to the Cape Fear Region of North Carolina, the inspectors attended storm 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 6 until

Enclosure

September 9, 2007, the inspectors monitored plant response to the adverse weather, the licensee's damage assessment, the licensee's review of emergency response capabilities, and corrective actions as a result of Tropical Storm Gabrielle. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns

a. Inspection Scope

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.

- Unit 2 A loop of residual heat removal service water when the B loop was OOS on August 7
- Unit 1 A loop residual heat removal service water when the B loop was OOS on September 10
- EDG #1, #2 and #4 while EDG #3 was OOS for scheduled maintenance on September 7

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

- AR 247201, End of tie rod missing from 1C conventional service water pump
- AR 247311, 1C Conventional service water pump strainer, broken tie rod

b. Findings

No findings of significance were identified.

1R05 Fire Area Walkdowns

a. Inspection Scope

The inspectors reviewed ARs and work orders (WOs) associated with the fire suppression system to confirm that their disposition was in accordance with Administrative 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 six 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. The inspectors reviewed Plant Operating Manual, Volume XIX, Prefire Plan 0PFP-DG, Diesel Generator Building Prefire Plans in preparing for the inspection.

- Diesel Generator Cells #1, #2, #3, and #4, 23' elevation (4 areas)
- Units 1 and 2 Reactor Building, 50' elevation (2 areas)

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

- AR 244658, 1B Nuclear service water pump inoperable for alternate safe shutdown (ASSD) will exceed 14 days

b. Findings

No findings of significance were identified.

1R06 Flood Protection

a. Inspection Scope

The inspectors performed a walkdown of the Service Water Building to verify that internal flood protection features were consistent with the licensee's internal flooding analysis as described in UFSAR Section 3.4.2, Protection From Internal Flooding. The inspectors reviewed the effects of postulated piping failures for the area to verify that analysis assumptions and conclusions were based on the current plant configuration. The internal flooding design features and equipment for coping with internal flooding were also inspected. The walkdown included sources of flooding and drainage, sump pumps, level switches, watertight doors, curbs, pedestals and equipment mounting. The inspectors reviewed the procedures for coping with internal flooding.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalificationa. Inspection Scope

The inspectors observed licensed operator performance and reviewed the associated training documents during simulator evaluated scenarios for training cycle 2007-05. The simulator observations and review included evaluations 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. Simulator sessions were observed on September 24, 2007. The scenarios tested the operators' ability to respond to secondary plant failures, loss of emergency power, and accidents. The inspectors reviewed operator 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 instructor critiques and preliminary grading of the operating crews and assessed whether appropriate feedback was planned to be provided to the licensed operators.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectivenessa. Inspection Scope

For the three 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 reviewed the work controls and work practices associated with the degraded performance or condition to verify that they were appropriate and did not contribute to the issue. 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-NGGC-0101, Maintenance Rule Program.

- AR 240978, Residual heat removal system service water pump suction valve (1-SW-V105) failure
- AR 243589, During performance of OPT-12.20 (Diesel Generator Monthly Load Test), DG #4 tripped on reverse power
- AR 243867, 1D Residual heat removal system service water booster pump motor trip

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Controla. 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 0AP-025, BNP Integrated Scheduling and Technical Requirements Manual 5.5.13, Configuration Risk Management Program. The inspectors reviewed the effectiveness of risk assessments performed due 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 WOs for the following five conditions:

- AR 240230, Unit 1 entered elevated (yellow) risk condition due to the B loop of residual heat removal being OOS on July 26, 2007 (emergent)
- AR 241122, Unit 1 entered elevated (yellow) risk condition due to erratic voltage regulator response on EDG #1 on July 30, 2007 (emergent)
- Unit 2 entered elevated (yellow) risk condition due to implementation of a modification to connect severe accident management guide EDG electrical connections to the 2B-1 battery charger on 9/25/07 (planned)
- Unit 2 entered elevated (orange) risk condition due to implementation of a modification to the 2A-1 battery charger on 9/26/07 (planned)
- AR 246074, Scaffolding rigging issues on the U-1 nuclear service water blind flange
- AR 243867, 1D Residual heat removal service water pump failure to start

b. Findings

No findings of significance were identified.

1R15 Operability Evaluationsa. Inspection Scope

The inspectors reviewed the operability evaluations associated with the five 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 any TS limiting condition for operation 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 240978, Operability condition review for the 1B, 2A, and 2B loops of residual heat removal service water due to isolation valve disc-to-stem pin issues
- AR 243465, Foreign material found in 1B residual heat removal room cooler
- AR 247907, EDG #2, Sparking and arcing on inner collector ring brushes
- AR 244301, 1D Residual heat removal service water booster pump axial vibration
- AR 244450, Incorrect electronic chip found in Unit 1 rod block monitor

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

- AR 240397, New breaker with wiring error
- AR 239591, Diesel generator inoperability
- AR 246214, Noise from 1C residual heat removal service water pump motor cooler outlet piping

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing

a. Inspection Scope

For the five maintenance activities listed below, the inspectors reviewed the post-maintenance 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. The inspectors verified 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 OPLP-20, Post Maintenance Testing Program.

- WO-1092989, Repair residual heat removal service water isolation valve (1-SW-V105)
- WO-1097974, Troubleshoot and repair EDG #1 manual voltage adjust potentiometer
- WO-1105321, EDG #3 Declared inoperable after performance of 2MST-SW12Q service water diesel generator cooling water supply low pressure instrument calibration and functional test due to a failed closing coil
- WO-1101951, Troubleshoot and repair the 1A Reactor recirculation pump trip
- WO-1092989, 2A Nuclear service water pump inoperable due to strainer shear pin

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activities

.1 Unit 1 Forced Outage B116F3

a. Inspection Scope

The inspectors evaluated the Unit 1 Forced Outage B116F3 which commenced on September 7, 2007. The unit was shut down to perform Nuclear Service Water (NSW) system repairs on the 1B NSW pump discharge valve. In addition, foreign material inspections were performed on the system as a result of Foreign Material found in the 1B Residual Heat Removal room cooler. The unit entered Mode 4 (Cold Shutdown) on September 7. Following the repairs and inspection of the NSW system, Unit 1 entered Mode 2 (Startup) and achieved criticality on September 20. Mode 1 (Power Operation) was entered on September 20, and full power was achieved on September 25. Documents reviewed are listed in the Attachment. The following specific areas were reviewed during the inspection period:

Outage Plan. The inspectors reviewed the outage plan to verify 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.

Shutdown and Cooldown. The inspectors observed operator portions of the Unit 1 cooldown to enter the outage and to verify that activities were in accordance with plant procedures. The inspectors verified that the licensee monitored cooldown restrictions by performing 1PT-01.7, Heatup/Cooldown Monitoring, to assure that TS cooldown restrictions were satisfied.

Licensee Control of Outage Activities. The inspectors observed and reviewed activities and plant conditions to verify that the licensee maintained defense-in-depth commensurate with the outage risk control plan. The inspectors reviewed the following specific items, as specified:

- Decay Heat Removal. The inspectors reviewed decay heat removal procedures and observed decay heat removal systems' parameters to verify proper removal of decay heat. The inspectors conducted main control room panel walkdowns and walked down portions of the system in the plant to verify system availability.
- Reactivity Control. The inspectors observed licensee performance during the outage to verify that reactivity control was conducted in accordance with procedures and TS requirements.

- Electrical Power. The inspectors reviewed the following licensee activities related to electrical power during the outage 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
- Controls and monitoring of electrical power systems and components and work activities in the power transmission yard

Monitoring of Heatup and Startup Activities. The inspectors reviewed ARs to verify, on a sampling basis, that TS, license conditions, and other requirements for mode changes were met prior to changing modes or plant configurations.

Identification and Resolution of Problems. The inspectors reviewed ARs to verify that the licensee was identifying problems related to outage 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 or planned:

- AR 246214, Rattle noise from 1C RHRSW pump motor cooler outlet piping
- AR 246324, 1B RHRSW Booster pump inspection
- AR 246126, Snubber 1-MS-4SS121 found with no indicated fluid
- AR 247769, Unit 1 Reactor Water Clean-up system trip

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing

.1 Routine Surveillance Testing

a. Inspection Scope

The inspectors either observed surveillance tests or reviewed test data for the six risk-significant SSC surveillances listed below to verify the tests met TS surveillance requirements, UFSAR commitments, in-service testing (IST) requirements, 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.

- Periodic Test OPT-12.2.A, Number 1 Diesel Generator Monthly Load Test, Rev. 90, performed on July 30, 2007
- Periodic Test OPT-12.2.D, Number 4 Diesel 1 Generator Monthly Load Test, Rev. 93 performed on August 20, 2007

- Periodic Test OPT-8.2.2C Unit 2 LPCI/RHR System Operability Test - Loop A, Rev. 64 performed on July 12, 2007
- Periodic Test OPT-231B, Unit 1, Suppression Pool to Drywell Vacuum Breaker Position Indication Check, Rev. 9, performed on July 24, 2007
- Periodic Test U-2 2MST-RHR28R, Residual Heat Removal Time Delay Channel Checks performed on August 8, 2007
- Periodic Test 2OI-03.2, Control Operator Daily Surveillance Report (including drywell leakage rate determination, performed the week of September 24, 2007

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

- AR 245345, Foreign material introduced into measuring and test equipment
- AR 244820, Diesel generator technical specification surveillance SR 3.8.1.2

b. Findings

Introduction : A self-revealing Green NCV of Technical Specification 5.4.1 was identified for failure to follow the Diesel Generator monthly load test procedure (OPT-12.2D) which resulted in Diesel Generator number 4 tripping on reverse power and locking out.

Description: During the performance of OPT-12.2D (Diesel Generator number 4 Monthly Load Test) on August 20, 2007, shortly after synchronization, Diesel Generator number 4 tripped and locked out on reverse power. The operators performing the synchronization indicated that the voltage adjust rheostat was mistakenly operated instead of the governor motor control switch.

The licensee's investigation found that, prior to synchronization, OPT-12.2D requires that running and incoming volts be matched. The field SRO (Senior Reactor Operator) noted that volts were not matched and directed the AO (Auxiliary Operator) to match voltages. After matching the voltages, the AO thought he returned his hands to the output breaker and governor switch. In fact, his hands were on the output breaker and the voltage regulator switch. The AO closed the output breaker and manipulated the switch he believed to be the governor switch to raise DG output. The AO was actually manipulating the voltage regulator and resulted in the DG tripping and locking out on reverse power.

The licensee convened a human performance review board to investigate the error. The board concluded that the apparent cause of the event was a human performance by the AO during synchronization. The AO failed to perform an adequate self-check prior to manipulating DG controls. This resulted in manipulating the incorrect switch, which led to the DG tripping on reverse power.

Analysis: The failure to follow OPT-12.2D (Diesel Generator Monthly Load Test) step 7.3.8 to immediately raise DG load once the output breaker is shut resulted in the DG tripping on reverse power and locking out. The finding was more than minor because it

was associated with the equipment performance attribute of the mitigating systems cornerstone objective of ensuring the availability of systems that respond to initiating events. The finding was assessed using the Significance Determination Process for Reactor Inspection and determined to be of very low safety significance (Green) because it did not contribute to a loss of the Diesel Generator safety function for greater than its technical specification allowed time. This finding was related to the human performance and error prevention aspect of the crosscutting area of human performance because the Diesel Generator tripping on reverse power and locking out was the result of a human error due to the failure to properly use self and peer checks H.4(a). This finding is in the licensee's corrective action program (CAP) as AR 243589.

Enforcement: Technical Specification 5.4.1, Administrative Control (Procedures), requires that written procedures shall be implemented covering applicable procedures recommended in Regulatory Guide 1.33, Appendix A, November 1972. Regulatory Guide 1.33 requires written procedures for Emergency Power Sources. Diesel Generator #4 Monthly Load Test procedure, OPT-12.2D, Revision 93, requires that after the Diesel Generator output Breaker is closed, that generator load is increased by placing the Governor Motor Control switch to raise. Contrary to Step 7.3.8 of OPT-12-2D, on August 20, 2007 the AO manipulated the Voltage Regulator switch in lieu of the Governor Motor Control Switch and as a result, Diesel Generator #4 tripped and locked out on reverse power. Because the finding is of very low safety significance and has been entered into the CAP (AR 243589), this finding is being treated as an NCV, consistent with Section VI.A of the Enforcement Policy: NCV 05000325/2007004-01, Diesel Generator Trip Due to Failure to Follow Procedure.

.2 In-service Surveillance Testing

a. Inspection Scope

The inspectors reviewed the performance of Periodic Test OPT-7.2.4B, Core Spray System Operability Test Loop B, Rev. 57, performed on Unit 1 on July 23, 2007. 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 Modificationsa. Inspection Scope

The inspectors reviewed Operating Manual 0PLP-22, Temporary Changes, to assess the implementation of Engineering Change (EC) 67829, Disable Auto Start Logic for 1B NSW Pump. The inspectors reviewed the EC to verify that the modification did not affect the functional capability of the EDG, that the modification was properly installed, and appropriate post-installation testing was performed.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

4. OTHER ACTIVITIES

4OA1 Performance Indicator (PI) Verificationa. Inspection Scope

The inspectors sampled licensee data for the performance indicators (PIs) listed below. To verify the accuracy of the PI data reported during the period reviewed, PI definitions and guidance contained in NEI 99-02, Regulatory Assessment Indicator Guideline, Rev. 5 were used to verify the basis for each data element.

Reactor Safety Cornerstone

The inspectors sampled licensee submittals for the Units 1 and 2 PIs listed below for the period July 2006 through June 2007.

- Residual Heat Removal
- Reactor Coolant System Leakage
- Reactor Coolant System Activity

A sample of plant records and data was reviewed and compared to the reported data to verify the accuracy of the PIs. The licensee's corrective action program records were also reviewed to determine if any problems with the collection of PI data had occurred. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

.1 Routine Review of ARs

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

.2 Annual Sample Review

a. Inspection Scope

The inspectors performed an in-depth annual sample review of the below-listed issues as documented in licensee corrective action documents 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 inspectors reviewed the following issues:

- AR 243465, Foreign material found in 1B room cooler inlet piping
- AR247311, 1C conventional SW pump strainer broken tie rod
- AR246790, 1A conventional SW pump strainer tube sheet fasteners
- AR246497, 1B RHR heat exchanger flange degradation

This inspection was conducted in parallel with a Special Inspection which was being performed to review the circumstances surrounding and the licensee's responses to foreign material found in the 1B room cooler inlet piping and a missing SW valve disc pin. This pin subsequently lodged in a RHRSW booster pump rendering it inoperable. This inspection focused on the physical/visual inspection of the Unit 1 nuclear SW header and its branch lines in the B train of the RHRSW system and B train RHR and core spray (CS) room coolers. The inspectors also reviewed the evaluation and disposition of emerging issues which arose during these inspections.

The inspectors observed and/or reviewed video camera inspections of the Unit 1 nuclear SW piping performed between September 9 and 15. The licensee's inspection included

Enclosure

visual and/or physical inspections of the piping for foreign material and the material condition of in-pipe valves and the B and D SW booster pumps.

b. Findings and Observations

One licensee-identified NCV is discussed in Section 4OA7. Special Inspection report 05000325, 324/2007011 will address root causes and enforcement, if any, associated with the room cooler foreign material and the valve disc pin.

Unit 1 SW piping inspection

The inspectors observed that the video camera inspections performed were of scope and sufficient clarity to provide assurance that the Unit 1 nuclear SW safety-related piping was free of material that could negatively impact flow to the B RHR heat exchanger and the B train RHR and CS room coolers or damage the B and D RHRSW booster pumps. Issues that arose during the inspection were documented in the licensee corrective action program for resolution. These included the discovery of two short pieces of threaded rod with nut(s) in the piping and B RHR heat exchanger, missing tie rod ends in the 1A and 1C conventional service water (CSW) pump strainers, and corrosion on the B RHR heat exchanger inlet pipe flange.

After discovery of the nut/threaded rod in the B RHR heat exchanger, the inspectors noted that one of the licensee's proposed actions was to leave the material in the heat exchanger and remove it in the next refueling outage. The discussions associated with this proposed course of action addressed the potential impact on the heat exchanger but failed to address the need to retrieve the piece such that its source could be identified and its components functionality could be assessed. Licensee management identified this limitation and directed the piece to be retrieved.

SW Pump Strainers

The licensee identified the nut/threaded rod pieces as being from the 1A and 1C CSW pump strainers. Their analysis and evaluation of the pieces were thorough and identified the failure mechanisms and likely causes as corrosion due to incorrect material (304 SS from the 1C CSW strainer) and fatigue cracking of a 316 SS tie rod in the 1A CSW strainer due to lack of sufficient torquing. A licensee-identified NCV associated with the incorrect material is discussed in Section 4OA7. The extent of condition review and corrective actions were comprehensive, in that, all Unit 2 SW pump strainers and two Unit 1 ones were inspected for similar conditions and all tie rods were replaced with ones verified to be made from 316 SS and were properly tightened. In addition, all tie rods in stores were verified to be the proper material. The licensee was still reviewing how the 304 SS tie rods were installed in the strainer. Work orders were issued to inspect the three remaining Unit 1 SW pump strainers, which were inspected prior to determining the failure mechanisms. Based upon the inspections which were performed, the inspectors considered that the inspection planned dates for these three strainer were appropriate. The licensee established an action item to include a torque value in their strainer preventive maintenance and inspection procedures. Based upon

Enclosure

the above information, the inspectors determined that the licensee's corrective actions for the strainer tie rod issues were appropriate and timely. Furthermore, the inspectors determined that no performance deficiency associated with fatigue failure existed because the vendor had not established a required torque value for the nuts on the tie rods.

Unit 1 B RHR Heat Exchanger Flange

The inspectors concluded that the licensee appropriately: (1) repaired the B RHR heat exchanger inlet piping flange corrosion, (2) determined that the heat exchanger was operable in its as-found condition, (3) inspected the similar flange of the A RHR heat exchanger, (4) evaluated the flange indications on the A RHR heat exchanger, (5) determined the corrosion mechanism, (6) identified other susceptible safety-related flanges in the Unit 1 and 2 SW systems, and (7) established corrective actions to modify flange inspection frequencies to reflect the greater than previously assumed corrosion rates.

The inspectors noted that earlier inspection frequency of four years was based upon invalid assumptions associated with the corrosion mechanism. However, it was not possible to determine with reasonable confidence that the licensee should have known that the inspection frequency was inadequate for certain flanges. Thus, no performance deficiency was identified for this issue.

4OA3 Event Follow-up

.1 Personnel Performance during Plant Evolutions

a. Inspection Scope

The inspectors observed and reviewed operator actions in response to the trip of the Unit 1 A recirculation pump motor-generator set on August 7, 2007. The inspectors verified the operator actions were in accordance with Abnormal Operating Procedure 1AOP.4.0, Low Core Flow. The inspector observed operators transition the unit into single recirculation loop operation. To assess operator performance during the transient, the inspectors reviewed operator logs, plant computer data, and observed operator actions.

b. Findings

No findings of significance were identified.

.2 Failure of Unit 1 A Loop Residual Heat Removal Service Water Isolation Valve (1-SW-V105):

While aligning the Unit 1 A loop of residual heat removal service water on July 26, 2007, isolation valve 1-SW-V105 experienced a failure. The failure was caused by the dislodgement of the valve's stem-to-disc pins. This resulted in the valve being failed in

the closed position which rendered the A loop of residual heat removal inoperable. 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 performed August 1, 2007 to October 9, 2007. Results of this Special Inspection will be documented in NRC Inspection Report Nos. 05000325/2007011 and 05000324/2007011.

.3 Confirmatory Split Sample Analyses

a. Inspection Scope

NRC Inspection Report 05000325, 324/2007003 documented initial event follow-up evaluation of onsite groundwater tritium concentrations exceeding Nuclear Energy Institute (NEI) voluntary reporting criteria. On June 13, 2007, the licensee notified local, county, and State of North Carolina authorities regarding the identification of groundwater tritium (H-3) concentrations in shallow onsite monitoring wells which exceeded recently established NEI voluntary reporting criteria. The subject wells were established to evaluate the potential movement of H-3 from the licensee's onsite storm drain stabilization pond (SDSP) to the surrounding groundwater environs and/or to onsite structures. Subject to final development of onsite groundwater monitoring wells, the NRC committed to conduct split sampling for subsequent radiological analysis of onsite and offsite surface and groundwater by the NRC, licensee, and State of North Carolina Department of Environment and Natural Resources (NCDENR) representatives.

On August 7, 2007, the NRC resident inspectors independently collected selected onsite groundwater and offsite surface water samples and submitted the samples for both tritium and gamma-emitting radionuclide analyses by the NRC vendor laboratory. Water samples were collected from onsite groundwater monitoring wells adjacent to west edge of the SDSP, i.e., 19C [shallow, approximately (~) 20 foot (') depth], 19B (intermediate, ~ 42' depth); and from well 24A, located east of the SDSP (deep, ~ 140' depth). In addition, surface water samples were collected from offsite locations that could be potentially affected by H-3 releases from the SDSP including Nancy Creek, Log Gum Branch Creek, and the Cape Fear River. The subject samples were split with the licensee and NCDENR representatives to evaluate the licensee's proficiency and accuracy in sampling and conducting quantitative radiological-analysis of environmental samples to acceptable levels of sensitivity.

Analyses of the selected onsite and offsite water samples for gamma-emitting radionuclides by the NRC, licensee, and NCDENR did not identify any radionuclide concentrations resulting from routine reactor operations which exceeded analytical detection limits. Established radionuclide detection levels were at concentration levels significantly less than those specified within the licensee's current Offsite Dose Calculation Manual. For tritium analyses, detectable concentrations were identified only for samples collected from the shallow and an intermediate groundwater monitoring well

located onsite and adjacent to the SDSP. For the reported data, licensee H-3 results were within agreement among the NRC, licensee, and NCDENR. The criteria used to compare the sample results are provided in A-5, and the results of the tritium comparisons among the NRC, licensee, and NCDENR are provided in A-6.

Licensee activities were evaluated against details and guidance documented in the following: 10 CFR Part 20 and Appendix I to 10 CFR Part 50; ODCM; RG 1.21, Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials In Liquid and Gaseous Effluents from Light-Water Cooled Nuclear Power Plants, June 1974; and RG 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations - Effluent Streams and the Environment, Rev. 1.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On October 29, 2007, the resident inspectors presented the inspection results to Mr. J. Scarola and other members of his staff. The inspectors confirmed that proprietary information was not provided or examined during the inspection.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a Non-Cited Violation.

10 CFR 50 Appendix B, Criterion V requires that activities affecting quality be prescribed by documented instructions, procedures or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures or drawings. Licensee's instruction, Vendor Manual Review and Approval EGR-NGGC-0006, revision 8, required the tie rods in the SW strainers to be 316 SS. Contrary to the above, in September 2007, four tie rods in the 1C CSW pump strainer were found to be 304 SS. This finding is of very low safety significance because it did not result in the loss of a safety function, in that, the 1C CSW pump strainer remained operable and no equipment became inoperable due to the generated foreign material. This violation was entered into the licensee's corrective action program as AR 247311.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

G. Atkinson, Supervisor - Emergency Preparedness
L. Beller, Superintendent Operations Training
A. Brittain, Manager - Security
D. Griffith, Manager - Training Manager
J. Ferguson, Manager - ER&C
L. Grzeck, Lead Engineer - Technical Support
T. Hobbs, Plant General Manager
S. Howard, Manager - Operations
R. Ivey, Manager - Site Support Services
W. Murray, Licensing Specialist
T. Pearson, Supervisor - Operations Training
A. Pope, Supervisor - Licensing/Regulatory Programs
S. Rogers, Manager - Maintenance
J. Scarola, Site Vice President
T. Sherrill, Engineer - Technical Support
T. Trask, Manager - Engineering
J. Titrington, Manger - Nuclear Assessment Services
M. Turkal, Lead Engineer - Technical Support
B. Waldrep, Director - Site Operations
M. Williams, Manager - Operations Support
W. Murray, Licensing Specialist

NRC Personnel

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

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

None

Opened and Closed

05000324/2007004-01	NCV	Diesel Generator Trip Due to Failure to Follow Procedure (Section 1R22)
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Discussed

None

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather

Plant Operating Manual (POM), Volume XXI, Abnormal Operating Procedure, 0AOP-13.0, Operation during Hurricane, Flood Conditions, Tornado, or Earthquake, Rev. 37
POM, Volume I, Administrative Instruction, 0AI-68, Brunswick Nuclear Plant Response to Severe Weather Warnings, Rev. 26
POM, Volume XIII, Plant Emergency Procedure 0PEP-02.6, Severe Weather, Rev. 10
Plant Operating Manual (POM), Volume XIII, Plant Emergency Procedure 0PEP-02.1, Initial Emergency Actions, Rev. 50

Section 1R04: Equipment Alignment

POM, Volume III, Operating Procedure 0OP-50.1, Diesel Generator Emergency Power System Operating Procedure, Rev. 67
POM, Volume III, Operating Procedure 2OP-16, Reactor Core Isolation Cooling System Operating Procedure, Rev. 99
POM Volume III, Operating Procedure 1OP-18, Core Spray System Operating Procedure, Rev. 44

Section 1R20: Refueling and Other Outage Activities

POM, Volume III, Operating Procedure 2OP17, Residual Heat Removal System Operating Procedure, Rev. 144
POM, Volume IV, General Plant Operating Procedure 0GP-01, Prestartup Checklist, Rev. 173
POM, Volume IV, General Plant Operating Procedure 0GP-02, Approach to Criticality and Pressurization of the Reactor, Rev. 86
POM, Volume IV, General Plant Operating Procedure 0GP-03, Unit Startup and Synchronization, Rev. 69
POM, Volume IV, General Plant Operating Procedure 0GP-12, Power Changes, Rev. 49
POM, Volume XII, Preventive Maintenance 0PM-CRN504, Inspection of Monorails (Single Girder), and Monorail Mounted Trolleys and Fixed Underhung Hoist, Rev. 30
POM, Volume XII, Preventive Maintenance 0PM-CRN002, Overhead Crane Checkout, Rev. 3
POM, Volume XII, Preventive Maintenance 0PM-CRN501, PM for the Fixed Gantry and Track Cranes, Rev. 24
POM, Volume XII, Special Maintenance Procedure 0SMP-RPV501, Reactor Vessel Disassembly, Rev. 7
POM, Volume XII, Maintenance Management Manual 0MMM-015, Operation and Inspection of Cranes and Material Handling Equipment, Rev. 40

Section 4OA3: Event Followup

Procedures, Guidance Documents, and Manuals

Offsite Dose Calculation Manual, Revision (Rev.). 25

Regulatory Compliance Instruction (ORCI) 6.1, Reportable Event Evaluation Criteria and Processing, Rev. 21.

OE&RC-3250, Groundwater Monitoring Program, Rev. 26

OE&RC-3101, Radiological Environmental Monitoring Program, Rev. 26

Records and Data

Storm Drain Collection Basin Tritium Concentration Data ($\mu\text{Ci/ml}$), July 2005 through June 19, 2007

Storm Drain Stabilization Pond Tritium Concentrations ($\mu\text{Ci/ml}$), July 2005 through June 19, 2007

Non-Unit Specific Radionuclide Trending Information: June 2005 - June 2007 for the following Manhole Locations: 1 SW, 1 NW, 2MH-2SW, 2-MH-2SE, 2-MH-2NW, MW-5, MW-6. 6 SW, 2MH3, 2-MH-3SW, 2-MH-MW3, 9SW, CB-2, CB-4 East, CB-4 West, MHC4, MH-CB7 East, MH-CB7 West, MH-SY6, MH-SY7, MH-WT2, MW-2, SY-4, TS6, TSC3, W 51,

Unit 1 (U1) Radwaste discharge line leak tests, 8/22/03 and 9/6/05

Unit 2 (U2) Radwaste discharge line leak tests, 9/29/04 and 9/26/06

Dose Summation and Projection Report, Gaseous Effluents, 5/1/07 - 5/31/07

Corrective Action Program (CAP) Documents

Action Request (AR) Number (No.) 232383, 233053, and 233865; Brunswick Nuclear Plant (BNP) Action Plan for tritium in groundwater, Rev. 6

Nuclear Condition Report (NCR) 184552, Tritium groundwater monitoring program, 2/16/06

NCR 188784, Electrical Manhole 2-MH-5NW water sample contained cesium-137

NCR 204962, Tritium activity in manhole 6 SW, 08/30/06

NCR 209023, Tritium identified in well ESS-3B, 10/11/06

NCR 229054, Low level tritium identified in March environmental sample, 04/10/07

NCR 232383, Tritium in manholes MW-5 and MW-6, 05/08/07

NCR 232440, E&RC requests for manhole samples, 05/09/07

NCR 233053, Tritium release to intake canal, 05/14/07

NCR 233427, Tritium release to intake canal, 05/17/07

NCR 233857, Airborne tritium pathway, 05/22/07

NCR 233865, Storm drain stabilization pond, 05/22/07

NCR 236175, SDSP Ditch release into the intake canal, 06/12/07

NCR 236389, Tritium identified in manhole 2-MH-2SE, 6/13/07

Confirmatory Measurements Comparison Criteria

The NRC applied the comparison criteria contained in NRC Inspection Procedure (IP) 84750, "Radioactive Waste Treatment, and Effluent and Environmental Monitoring," dated March 15, 1994, to determine if the licensee's measurement results were in statistical agreement with the NRC measurement results. For the purposes of this comparison, the NRC result is divided by its associated uncertainty to obtain the resolution. (Note: For purposes of this process, the uncertainty is defined as the relative standard deviation, one sigma, of the NRC's contract laboratory's analysis.) The licensee's result is then divided by the corresponding NRC result to obtain the ratio (licensee result/NRC). The licensee's measurement is in agreement if the value of the ratio fall within the limits shown in the following table for the corresponding resolution.

Resolution	Acceptance Range (Licensee Result/NRC Result)
<4	Technical Judgement
4-7	0.5-2.0
8-15	0.6-1.66
16-50	0.75-1.33
51-200	0.80-1.25
>200	0.85-1.18

For analyses that are below the minimum detectable concentration (either for the licensee or NRC's contract laboratory), the measurements are determined to be in agreement if both are below the minimum detectable concentration or if one has an uncertainty that is within the minimum detectable concentration.

SPLIT -SAMPLE TRITIUM ANALYSIS RESULTS

SAMPLE ⁽¹⁾ LOCATION	COLLECTION DATE	CONCENTRATION ⁽²⁾ [pCi/l (\pm 2 Std Deviations)]			RESOLUTION ⁽³⁾	RATIO Licensee/NRC	COMPARISON ⁽⁴⁾
		NRC	Licensee	NCDENR			
WP-50	08/07/07	< 280	< 244	< 250	NA	NA	A
WP-56	08/07/07	< 280	< 244	< 250	NA	NA	A
WP 62	08/07/07	< 280	< 243	< 250	NA	NA	A
ESS-24A	08/07/07	< 280	< 247	< 250	NA	NA	A
ESS-19B	08/07/07	3,680 (\pm 280)	2,993 (\pm 193)	3,676 (\pm 220)	26	0.81	A
ESS-19C	08/07/07	450,000 (\pm 4,900)	394,200 (\pm 1397)	443,182 (\pm 1,444)	184	0.87	A

⁽¹⁾ Way Point (WP) 50, Offsite Surface Water Sample, Gum Log Branch, Northeast of Storm Drain Stabilization Pond (SDSP)
 WP-56. Offsite surface Water Sample , Nancy Creek, North West of SDSP, Across from ESS-19B&C
 WP-62. Offsite Surface Water Sample, Cape Fear River, Mount of River Channel @ Diversion Structure
 ESS 24A, Onsite Groundwater Monitoring Well East of Storm Drain Stabilization Pond. Depth of ~ 140 feet ;
 ESS 19B, Onsite Groundwater Monitoring Well, Adjacent to West Side of Storm Drain Stabilization Pond, Depth of 42 feet
 ESS 19C, Onsite Groundwater Monitoring Well Adjacent to West Side of Storm Drain Stabilization Pond , Depth of ~ 20 feet

⁽²⁾ Analytical Detection Limits Provided for Reported Results Below Established Detection Limits

⁽³⁾ NRC Value/1 Standard Deviation; See Enclosure 1 for Acceptance Criteria

⁽⁴⁾ Agreement with NRC analyses based on criteria detailed on page A-5. For analyses that are below the minimum detectable concentration (either for the licensee or NRC's contract laboratory), the measurements are determined to be in agreement if both are below the minimum detectable concentration or if one has an uncertainty that is within the minimum detectable concentration