



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos. 50-325/88-01 and 50-324/88-01

Licensee: Carolina Power and Light Company
P. O. Box 1551
Raleigh, NC 27602

Docket No. 50-325 and 50-324 License No. DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: January 1 - 31, 1988

Inspector: S. Vias 3/14/88
W. H. Ruland Date Signed

Accompanying Personnel: D. J. Nelson
S. J. Vias
L. Wert

Approved By: P. E. Fredrickson 3/14/88
P. E. Fredrickson, Section Chief Date Signed
Division of Reactor Projects

SUMMARY

Scope: This routine safety inspection by the resident inspector involved the areas of followup on previous enforcement matters, maintenance observation, surveillance observation, operational safety verification, preparation for refueling, followup on inspector identified and unresolved items, onsite followup of events, inadvertent heatup of Unit 1, and plant modifications.

Results: In the areas inspected, one violation was identified - failure to complete Technical Specification surveillance within the required time. A personnel error which allowed an inadvertent heatup of the reactor coolant system and a question concerning the seismic class of the Radiation Monitoring System remained unresolved at the conclusion of the inspection.

DETAILS

1. Persons Contacted

Licensee Employees

- *E. Bishop, Manager - Operations
- *S. Callis, On-Site Licensing Engineer
- *G. Cheatham, Manager - Environmental & Radiation Control
- R. Creech, I&C/Electrical Maintenance Supervisor (Unit 2)
- *C. Dietz, General Manager - Brunswick Nuclear Project
- *R. Eckstein, Manager - Technical Support
- *K. Enzor, Director - Regulatory Compliance
- R. Groover, Manager - Project Construction
- W. Hatcher, Supervisor - Security
- A. Hegler, Superintendent - Operations
- *R. Helme, Director - Onsite Nuclear Safety - BSEP
- J. Holder, Manager - Outages
- *P. Howe, Vice President - Brunswick Nuclear Project
- *L. Jones, Director - Quality Assurance (QA)/Quality Control (QC)
- R. Kitchen, Mechanical Maintenance Supervisor (Unit 2)
- J. Moyer, Manager - Training
- G. Oliver, Manager - Site Planning and Control
- *J. O'Sullivan, Manager - Maintenance
- B. Parks, Engineering Supervisor
- *R. Poulk, Senior NRC Regulatory Specialist
- *J. Smith, Director - Administrative Support
- R. Warden, I&C/Electrical Maintenance Supervisor (Unit 1)
- D. Warren, Acting Engineering Supervisor
- B. Wilson, Engineering Supervisor
- *T. Wyllie, Manager - Engineering and Construction

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, office personnel, and security force members.

*Attended the exit interview

2. Exit Interview (30703)

The inspection scope and findings were summarized on February 3, 1988, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection findings listed below. Dissenting comments were not received from the licensee. Proprietary information is not contained in this report.

<u>Item Number</u>	<u>Description/Reference Paragraph</u>
325/88-01-01 & 324/88-01-01	VIOLATION - Failure to Perform DG Surveillance Within TS Time Limits (paragraph 4.a).

325/88-01-02 & 324/88-01-02	URI* - Seismic Requirements for Radiation Monitoring System (paragraph 4.b).
325/88-01-03	URI - Inadvertent Heatup During Cold Shutdown (paragraph 10.)
325/88-01-04 & 324/88-01-04	IFI - Review DG Reliability Assessment (paragraph 4.a).

Note: Acronyms and abbreviations used in the report are listed in paragraph 12.

3. Followup on Previous Enforcement Matter (92702)

(OPEN) Violation 325/87-02-05 and 324/87-02-05, Failure to Follow Maintenance Procedures When Installing Motor-Operated Valve Anti-Rotation Devices. The licensee found a problem with the anti-rotation device of valve 1-E51-F022, the RCIC return to the CST. In response to the violation the licensee had re-inspected the above valve with satisfactory results. Based on log reviews and interviews, the inspector found that: on January 8, QA had found that the anti-rotation device for F022 had fallen down the valve shaft and the valve shaft-to-ARD key had fallen down to the bonnet area. The licensee re-inspected all accessible Anchor-Darling valves with anti-rotation devices under WR/JO 88-AARJ1 and 88-AARK1.

The only other problem found was with 2-G31-F042, RWCU Return to Vessel Isolation Valve, which was found with the set screw and key intact but the ARD loose on the shaft. The licensee had a vendor representative inspect the F022 valve. The vendor representative recommended that the licensee use a tighter fit between valve stem and ARD. The licensee plans to inspect the ARDs routinely every 9 months until the inspection results dictate a change.

(CLOSED) Violation 325/87-13-02, Failure to Properly Implement Surveillance Procedure. During ILRT, one channel of high drywell pressure instrument was not de-energized as required due to a fuse labeling problem. A reactor steam dome pressure instrument was disabled instead. The inspector reviewed records documenting the licensee's corrective actions, including a review of procedure changes.

(CLOSED) Violation 325/87-17-01, Plant Incident and Post Trip Investigation Form Not Completed as Required by OI-22. The inspector reviewed records, including the revisions to OI-22. The inspector has no further questions or concerns.

No significant safety matters, violations, or deviations were identified.

*An Unresolved Item is a matter about which more information is required to determine whether it is acceptable or may involve a violation or deviation.

4. Maintenance Observation (62703)

The inspectors observed maintenance activities, interviewed personnel, and reviewed records to verify that work was conducted in accordance with approved procedures, Technical Specifications, and applicable industry codes and standards. The inspectors also verified that: redundant components were operable; administrative controls were followed; tagouts were adequate; personnel were qualified; correct replacement parts were used; radiological controls were proper; fire protection was adequate; quality control hold points were adequate and observed; adequate post-maintenance testing was performed; and independent verification requirements were implemented. The inspectors independently verified that selected equipment was properly returned to service.

Outstanding work requests were reviewed to ensure that the licensee gave priority to safety-related maintenance.

The inspectors observed/reviewed portions of the following maintenance activities:

- 88-AABF2 Inspection of Miller Actuator for 2-G16-F020.
- 88-AAYJ1 Replacement of JWPSR Allen-Bradley Relay in DG No. 2.
- 88-FFG021 Megger E-7 Transformer per MI-10-2L1.
- 88-KAD021 GE 480VAC MCC Checkout per MI-10-2K1 for Switchgear 1PA.
- 87-BI2U1 Valve 1-SW-V212 CR205 Auxiliary Contact Replacement.
- 87-BJ1J1 1-CAC-FS-4409-35 Sample Return Flow Switch Replacement.

a. Diesel Generator Items

- o Several apparently unrelated emergency diesel generator failures occurred during the month that warrant further licensee and inspector followup. Problems included failed fuel oil level switches, intermittent annunciator relay contacts, and broken wire lug. The inspector conducted interviews with plant maintenance personnel, reviewed logs, examined records and equipment and determined that the licensee corrected the equipment problem in each case. However, the reliability numbers of the emergency diesel generators were lowered by the DG outages. The Onsite Nuclear Safety group developed a review plan to examine DG reliability. The plan calls for a review of recent DG failures using a systematic methodology. Current DG availability will be compared to PRA model assumptions, station blackout requirements and industry averages. A separate plan and schedule for reliability centered maintenance may also be developed.

The inspector concluded that the licensee's response to the issue was appropriate. The plan, schedule, and results will be reviewed during future inspections. This is an Inspector Followup Item: Review DG Reliability Assessment (325/88-01-04 and 324/88-01-04).

- o The inspector found, during a log review on January 5, that the TS surveillance (quick start and load the DGs for 15 minutes) was not completed within two hours as required with two DGs declared inoperable. On January 4, at 6:43 p.m., DG No. 3 was declared inoperable for a slow start slightly greater than the TS requirement of 10 seconds. Per TS Action statement 3.8.1.1.b.2, the licensee is required to demonstrate operability of the remaining diesel generators by performing TS surveillance requirements 4.8.1.1.2.a.4 and .5. These surveillance tests require the verification that the diesel starts, and accelerates to at least 514 RPM in less than or equal to 10 seconds, and that the generator is synchronized, loaded to greater than or equal to 1750 KW, and operates for greater than or equal to 15 minutes. On January 5, at 3:52 p.m., DG No. 1 was declared inoperable for a trip reportedly during paralleling with no alarms, making two DGs inoperable. Once two DGs are inoperable, TS ACTION statement 3.8.1.1.e.1 requires the above surveillance requirements to be completed within two hours. Based on a review of PT-12.8, which implements the above surveillance, the last surveillance was not completed until 6:00 p.m., eight minute beyond the allowed time. The 8 minute late surveillance by itself has minimal safety significance. However, the shift foreman had failed to recognize the two hour requirement for the surveillance test; thus being late only 8 minutes was fortuitous.

Both DGs 2 and 4 had their surveillance tests completed satisfactorily. A lug and a relay were replaced and DG No. 1 was run satisfactorily and returned to service on January 5 at 9:15 p.m. DG No. 3 was returned to service on January 6 at 5:17 p.m., after the licensee discovered they were misinterpreting the start data. Failure to perform TS surveillance requirement 4.8.1.1.2.a.5 within 2 hours as called for in TS Action statement 3.8.1.1.e.1, with 2 DGs declared inoperable is a Violation: Failure to Perform DG Surveillance Within TS Time Limits (325/88-01-01 and 324/88-01-01).

- b. On January 6, the inspector found a paper towel wedged between the stack radiation monitor sample pump motor and a nearby support. The paper towel kept the motor from vibrating. No trouble ticket had been issued on the problem at that time. The licensee wrote a trouble ticket (88-AAMR1) after being informed of the problem. The licensee found that one of the motor mount bolts was missing but that no operability concern existed. The pump supplies stack effluent to the accident monitoring instrumentation (TS 3.3.5.3) ventilation high range noble gas monitors and the various radioactive gaseous effluent monitoring instrumentation (TS 3.3.5.9). FSAR section 3.2.1.2 states that part of the Radiation Monitoring System is seismic class I. The system engineer reported that the isokinetic probe, which supplies the sample to the pump, and stack sample house, which houses the pump, had no seismic requirements per plant modification 80-036. The

licensee agreed in the exit to inform the inspector what portions of the RMS are seismic class I per the FSAR. This is an Unresolved Item: Seismic Requirements for Radiation Monitoring System (325/88-01-02 and 324/88-01-02).

The licensee agreed with the inspector that the "paper towel" solution vice writing a work request was inappropriate. They would take corrective action without waiting for resolution of the seismic question.

No significant safety matters, one violation, and no deviations were identified.

5. Surveillance Observation (61726)

The inspectors observed surveillance testing required by Technical Specifications. Through observation, interviews, and record review, the inspectors verified that: tests conformed to Technical Specification requirements; administrative controls were followed; personnel were qualified; instrumentation was calibrated; and data was accurate and complete. The inspectors independently verified selected test results and proper return to service of equipment.

The inspectors witnessed/reviewed portions of the following test activities:

1MST-LKDET21R System	Leak Detection Containment Sump Flow Integrating Channel Calibration.
2MST-DG13R	DG 3 Trip Bypass Test.
OI-3.2	Control Operator Daily Surveillance.
OI-3.3	Outside Auxiliary Operator Daily Surveillance Report, Completed January 29, 1988.
PT-12.6	Breaker Alignment Surveillance.

No significant safety matters, violations, or deviations were identified.

6. Operational Safety Verification (71707)

The inspectors verified that Unit 1 and Unit 2 were operated in compliance with Technical Specifications and other regulatory requirements by direct observations of activities, facility tours, discussions with personnel, reviewing of records and independent verification of safety system status.

The inspectors verified that control room manning requirements of 10 CFR 50.54 and the Technical Specifications were met. Control operator, shift supervisor, clearance, STA, daily and standing instructions, and jumper/

bypass logs were reviewed to obtain information concerning operating trends and out of service safety systems to ensure that there were no conflicts with Technical Specifications Limiting Conditions for Operations. Direct observations were conducted of control room panels, instrumentation and recorder traces important to safety to verify operability and that operating parameters were within Technical Specification limits. The inspectors observed shift turnovers to verify that continuity of system status was maintained. The inspectors verified the status of selected control room annunciators.

Operability of a selected Engineered Safety Feature division was verified weekly by insuring that: each accessible valve in the flow path was in its correct position; each power supply and breaker was closed for components that must activate upon initiation signal; the RHR subsystem cross-tie valve for each unit was closed with the power removed from the valve operator; there was no leakage of major components; there was proper lubrication and cooling water available; and a condition did not exist which might prevent fulfillment of the system's functional requirements. Instrumentation essential to system actuation or performance was verified operable by observing on-scale indication and proper instrument valve lineup, if accessible.

The inspectors verified that the licensee's health physics policies/procedures were followed. This included observation of HP practices and a review of area surveys, radiation work permits, posting, and instrument calibration.

The inspectors verified that: the security organization was properly manned and security personnel were capable of performing their assigned functions; persons and packages were checked prior to entry into the protected area; vehicles were properly authorized, searched and escorted within the PA; persons within the PA displayed photo identification badges; personnel in vital areas were authorized; and effective compensatory measures were employed when required.

The inspectors also observed plant housekeeping controls, verified position of certain containment isolation valves, checked a clearance, and verified the operability of onsite and offsite emergency power sources.

No significant safety matters, violations, or deviations were identified.

7. Preparation for Refueling on Unit 2 (60705)

The inspector reviewed the Fuel Handling Procedure FH-11, concentrating on completion of prerequisites required prior to defueling. Two minor administrative errors were noted:

- o Step 3.3 contained an initial for completion and a comment to refer to "Note 1" but no Note 1 was recorded. Step 3.3 requires completion of PT-18.1, Refueling Interlocks check, and PT-18.2, Service Platform check. PT-18.1 had been completed but PT-18.2 was not required to be

completed since no usage of the platform is planned this outage. After the inspector questioned the absence of a "Note 1", it was added to the procedure and adequately explained the above circumstances.

- o Step 3.10 requires completion of Appendix B, System Electrical Lineup Checklist. This step was initialled as completed on Step 3.10 but the actual appendix had no approval, signature or time started/finished recorded. This was promptly corrected when pointed out by the inspector. The inspector verified that Appendix B had actually been completed.

FH-11 also contains a step which requires the operators to ensure only appropriately qualified personnel operate the refueling bridge. The inspector questioned a senior control operator in the control room on how this requirement was satisfied. The operator was not sure how this step was completed. The licensee stated and the inspector verified that qualification cards were completed and maintained on each qualified operator. A list of these qualified refueling bridge operators was normally maintained in the SOS office but had not been placed there this refueling outage. This situation was corrected by obtaining the list. The qualification cards were filed in the same folder as FH-11 for easy accessibility to control room operators.

The inspector reviewed GP-07, Preparations for Core Alterations, Revision 10, and observed defueling operations.

No significant safety matters, violations, or deviations were identified.

8. Followup on Inspector Identified and Unresolved Items (92701)

- a. (CLOSED) Unresolved Item (325/87-42-04), Thermometer in Unit 1 Standby Liquid Control Tank.

As described in the subject report, a thermometer was discovered inside the SLC tank. Inspection Report 50-325/86-12 and 50-324/86-13 discussed a similar situation in which the resident inspector in May, 1986 found a small piece of opaque plastic wrap floating in the tank. As a result of that occurrence the licensee revised procedure No. 1130, Monthly Determination of Sodium Pentaborate Solution in the SLC Tank, to include a step (7.4) which requires a tank inspection after samples are obtained. The tank hatch has a permanent caution tag attached to it with directions to contact the shift foreman prior to opening the hatch. The procedure also requires independent verification of hatch closure. While performing step 7.4 of E&RC No. 1130 on December 23, 1987, the E&RC technician observed the thermometer on the bottom of the tank. The thermometer was removed from the tank. The licensee's investigation of the incident was unable to determine

how the thermometer got into the tank. No procedures now or recently in use require such thermometers to be used in the SLC tank. The licensee concluded the thermometer has been in the tank for an extended time and remained undiscovered until now.

The inspector reviewed drawings of the tank to obtain arrangement and dimensional information on the tanks sparger piping, structural support members, and the location of the outlet (to suction of SLC pumps) of the tank. The inspector then conducted a visual examination of the tank. Although the water clarity was good and the bottom of the tank was visible, the sparger piping and structural supports inside the tank could cause the thermometer to remain undiscovered despite monthly inspections of the tank. The inspector did not observe any foreign objects in the tank and verified the outlet was free of debris. Based on the location where the thermometer was found, the arrangement of the sparger piping with respect to the outlet location, and the low velocities expected in the tank, the inspector concluded that blockage of the tank outlet by the thermometer was unlikely. The inspector did bring to the licensee's attention that apparently the sparger air supply isolation valve was leaking, allowing some air flow through the sparger piping into the tank, reducing visibility. The licensee has lockwired shut the hatch on the tank. Based on the above information, action to prevent material entering the tank in the future appears adequate and the probability that the thermometer could have adversely affected the operability of the SLC system appears very small.

- b. (CLOSED) Inspector Followup Item (325/87-17-02 and 324/87-17-02), OI-41, Operator Aids Discrepancies.

The inspector verified, through document review, that the licensee performed the revised audit of operator aids and verified that no "Information Only" copies of procedures were maintained in logbooks. The inspector also reviewed the latest revision of OI-29, Operations Internal Audits, Rev. 13, January 27, 1988. The procedure now contains additional controls to ensure audit completion.

- c. (OPEN) Inspector Followup Item (325/87-42-09 and 324/87-43-09), DG Building Supply Fan "A" Failure.

The licensee will complete the metallurgical analysis of the fan blade by February 12, 1988. The liquid penetrant tests on the B&C fan blades will be completed by May 10, 1988. The inspector reviewed the NDE report for a liquid penetrant test conducted on a "D" supply fan that the system's engineer reported had been in service for about 8 years. No indications of cracks were found. Based on the exam results, the inspector concluded that the licensee's schedule of future inspections and evaluations was appropriate. This item remains open pending the completion of the licensee inspections and evaluation.

No significant safety matters, violations, or deviations were identified.

9. Onsite Followup of Events on Units 2 (93702)

The inspector reported to the site on January 3, 1988, to followup on a manual scram and failures of the drywell equipment and floor drain containment isolation valves. The inspector conducted the initial event assessment, forwarding the information to regional management. Based on the information supplied by the inspector, NRC sent an AIT to followup on the event. The results of the AIT are documented in report nos. 325/88-03 and 324/88-03. Conclusions are contained in the AIT report.

10. Inadvertent Heatup of Unit 1 (93702)

The unit operator inadvertently allowed the reactor coolant system to heatup to about 210 degrees F. The unit had been in cold shutdown prior to the event, maintaining RCS temperature at 120 degrees F using the Division II RHR system in shutdown cooling and running the "D" RHR pump. The operator had been maintaining temperature by throttling the 1B RHR heat exchanger outlet valve, 1-E11-F003B. Based on temperature recorder traces, the F003B valve was shut about 2:45 a.m., on January 26, 1988. At 4:30 a.m., the operator discovered the F003B valve shut and immediately opened the F003B valve and shut the heat exchanger bypass valve, 1-E11-F048B, commencing a cooldown. The operators reported no indications of boiling in the RCS. This is confirmed by recorder traces observed by the inspector.

The licensee instituted a review of the event and put short term corrective actions in place shortly after the event. The operators are now required to record RHR heat exchanger temperatures every half hour. Operators were instructed on the event prior to assuming the shift. Since the operator had caught his own error, reported it to management, and corrective action has been aggressive so far, enforcement action consideration will be deferred until after the licensee's review (OER) has been completed. The licensee, during the event, committed to complete the OER by February 29, 1988. This matter remains Unresolved pending inspector review of the OER: Inadvertent Heatup During Cold Shutdown (325/88-01-03).

A significant personnel error occurred which will be reviewed during future inspections; no violations or deviations were identified.

11. Plant Modifications (37700)

The inspectors reviewed plant modifications to verify compliance with 10CFR50.59, Technical Specifications, and ENP-03, Plant Modification Procedure, Revision 35. The inspectors verified, through record reviews, interviews and observation of work and equipment, that the licensee

performed plant modification work satisfactorily. Specifically, the inspector verified that:

- o The modifications were reviewed and approved in accordance with 10CFR50.59.
- o QA/QC signoffs were appropriate and completed as necessary.
- o Work was controlled by approved procedures and drawings.
- o Appropriate procedure and drawing revisions were identified.
- o Procedures were in place to include modification in annual 50.59(b).

The inspector reviewed PM-84-004, Addition of Accumulators for Safety Relief Valves 2-B21-F013B, E & G, using the above criteria. Observation of work activities was also performed for:

- | | |
|-----------|--|
| PM-84-084 | Provide Alternate Feed for 2-B21-F016 and Local Control for 2-B21-F019. |
| PM-84-042 | Enhance Control for 2-E51-F013, 2-E51-F019, and Vacuum and Condensate Pumps. |

No significant safety matters, violations, or deviations were identified.

12. List of Abbreviations for Unit 1 and 2

AI	Administrative Instruction
AIT	Augmented Inspection Team
AO	Auxiliary Operator
ARD	Anti-Rotation Device
BSEP	Brunswick Steam Electric Plant
CST	Condensate Storage Tank
DG	Diesel Generator
E&RC	Environmental & Radiation Control
ENP	Engineering Procedure
ERFIS	Emergency Response Facility Information System
ESF	Engineered Safety Feature
F	Degrees Fahrenheit
FSAR	Final Safety Analysis Report
GE	General Electric
GP	General Procedure
HP	Health Physics
HPCI	High Pressure Coolant Injection
HVAC	Heating, Ventilating, Air Conditioning System
HX	Heat Exchanger
I&C	Instrumentation and Control
IE	NRC Inspection and Enforcement
IFI	Inspector Followup Item

ILRT	Integrated Leak Rate Test
IPBS	Integrated Planning Budget System
JO	Job Order
KW	Kilowatt
LER	Licensee Event Report
MI	Maintenance Instruction
MCC	Motor Control Center
NDE	Non-Destructive Examination
NRC	Nuclear Regulatory Commission
OER	Operating Experience Report
OI	Operating Instruction
OP	Operating Procedure
PA	Protected Area
PM	Procedure Modification
PRA	Probabilistic Risk Assessment
PT	Periodic Test
PNSC	Plant Nuclear Safety Committee
QA	Quality Assurance
QC	Quality Control
RHR	Residual Heat Removal
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RMS	Radiation Monitoring System
RPM	Revolutions Per Minute
RWCU	Reactor Water Cleanup
SLC	Standby Liquid Control
SOS	Shift Operating Supervisor
SP	Special Procedure
SW	Service Water
TS	Technical Specification
URI	Unresolved Item
WR	Work Request