



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

Report Nos. 50-325/85-33 and 50-324/85-33

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

Docket Nos. 50-325 and 50-324

License Nos. DPR-71 and DPR-62

Facility Name: Brunswick 1 and 2

Inspection Conducted: September 1 - 30, 1985

Inspectors: *J. S. Mellen*  
For *W. H. Ruland*

*10/18/85*

Date Signed

*J. S. Mellen*  
For *L. W. Garner*

*10/18/85*

Date Signed

Approved By:

*P. E. Fredrickson*  
P. E. Fredrickson, Section Chief  
Division of Reactor Projects

*10/18/85*

Date Signed

SUMMARY

Scope: This routine safety inspection involved 126 inspector-hours on site in the areas of maintenance observation, surveillance observation, operational safety verification, onsite followup of events and main steam isolation valve (MSIV) solenoid failures.

Results: One violation was identified: Failure to maintain two valves in the open position per Technical Specification required procedure OP-46; paragraph 7a. One unresolved item was identified: Main steam isolation valve solenoid failures; paragraph 8.

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## DETAILS

### 1. Persons Contacted

#### Licensee Employees

P. Howe, Vice President - Brunswick Nuclear Project  
C. Dietz, General Manager - Brunswick Nuclear Project  
T. Wyllie, Manager - Engineering and Construction  
G. Oliver, Manager - Site Planning and Control  
J. Holder, Manager - Outages  
E. Bishop, Manager - Operations  
L. Jones, Director - QA/QC  
J. Moyer, Director - Training  
M. Jones, Acting Director - Onsite Nuclear Safety - BSEP  
J. Chase, Assistant to General Manager  
J. O'Sullivan, Manager - Maintenance  
G. Cheatham, Manager - Environmental & Radiation Control  
K. Enzor, Director - Regulatory Compliance  
B. Hinkley, Manager - Technical Support  
L. Boyer, Director - Administrative Support  
V. Wagoner, Director - IPBS/Long Range Planning  
C. Blackmon, Superintendent - Operations  
J. Wilcox, Principle Engineer - Operations  
W. Hogle, Engineering Supervisor  
W. Tucker, Engineering Supervisor  
B. Wilson, Engineering Supervisor  
R. Creech, I&C/Electrical Maintenance Supervisor (Unit 2)  
R. Warden, I&C/Electrical Maintenance Supervisor (Unit 1)  
W. Dorman, Supervisor - QA  
W. Hatcher, Supervisor - Security  
R. Kitchen, Mechanical Maintenance Supervisor (Unit 2)  
C. Treubel, Mechanical Maintenance Supervisor (Unit 1)  
R. Poulk, Senior NRC Regulatory Specialist  
D. Novotny, Senior Regulatory Specialist  
W. Murray, Senior Engineer - Nuclear Licensing Unit

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

### 2. Exit Interview (30703)

The inspection scope and findings were summarized on October 1, 1985 with the general manager. The licensee acknowledged the findings without exception. The violation described in paragraph 7a was discussed in detail. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during the inspection.

3. Followup on Previous Enforcement Matters (92702)

Not inspected.

4. Maintenance Observation (62703)

The inspectors observed maintenance activities 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; QC 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 and authorizations (WR&A) were reviewed to ensure that the licensee gave priority to safety-related maintenance.

No violations or deviations were identified.

5. Surveillance Observation (61726)

The inspectors observed surveillance testing required by Technical Specifications. Through observation 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:

1 MST-RHR26R	RHR CS LO REACTOR PRESS PERMISSIVE INST CHAN CAL
2 MST-RHR22M	RHR-LPCI ADS CS LL3, HPCI RCIC LL2 DIV I TR UNIT CHAN CAL
PT-1.1.12P	MAIN STEAM LINE RADIATION CHANNEL ALIGNMENT AND FUNCTIONAL TEST
PT-4.1.6P	PROCESS RADIATION MONITORING SYSTEM AIR SAMPLING SYSTEM & WASTE GAS EFFLUENT MONITORS

No violations or deviations were identified.

## 6. Operational Safety Verification (71707)

The inspectors verified conformance with 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 room, shift supervisor, clearance 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 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 ESF train was verified by insuring that: each accessible valve in the flow path was in its correct position; each power supply and breaker, including control room fuses, were aligned for components that must activate upon initiation signal; removal of power from those ESF motor-operated valves, so identified by Technical Specifications, was completed; 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 a review of area surveys, radiation work permits, posting, and instrument calibration.

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

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 violations or deviations were identified.

## 7. Onsite Followup of Events (93702)

### a. Reactor Scram

On September 4, 1985 at 4:26 a.m., Unit 2 was manually scrammed from 100% power. The manual scram was initiated by the control operator after he observed that: 1) the SCRAM PILOT AIR HEADER PRESSURE HI/LOW annunciator was lit; 2) multiple (>20) rod drift indications were lit; and 3) two blue control rod scram lights on the full core display were lit. The manual scram required by the rod drift annunciator procedure was initiated within 6 seconds of the first rod drift alarm. The High Pressure Coolant Injection (HPCI) system and the Reactor Core Isolation Cooling (RCIC) system auto started but did not inject. Reactor feed pump response to the water level shrink resulted in filling the vessel to the turbine trip setpoints. Both feedpump turbines and the HPCI and RCIC turbines tripped on high level. Attempts to manually start RCIC failed due to high exhaust pressure trip. The HPCI system was subsequently started to control vessel level until the A reactor feedpump was returned to service and normal shutdown was commenced. Reactor pressure was controlled during the event by the turbine bypass system. Actions taken were in accordance with emergency procedure EOP-01 (scram recovery).

The low scram pilot valve air header pressure resulted from an auxiliary operator (AO) inadvertently closing the air supply valves to the header. In preparation to perform maintenance instruction MI 10-504B on check valve 2-SA-V53, the AO was aligning valves in accordance with clearance No. 2-1107. The clearance instructed him to close valves 2-SA-V301 and V302 over motor control center 2XM. The valves in this location were actually the header air supply valves, RNA-V202 and V203, and were labeled as such. The AO dressed out, climbed up to the area, incorrectly read the valve numbers and closed the valves. Air leaks in the header resulted in the low pressure condition and subsequent drifting in of control rods.

Operating procedure OP-46 requires the RNA-V202 and V203 valves to be in the open position. Equipment control procedures required by Technical Specification 6.8.1.a and Appendix A of Regulatory Guide 1.33 dated November 1972, as implemented by OI-13, require all valves be maintained in the position required by the OP valve lineup. Closure of the valves was a failure to maintain the valves in their OP lineup. This is a violation (324/85-33-01).

During review of safety system response to the event, the licensee concluded that all ESF functions performed as designed. However, certain items required review.

HPCI and RCIC turbines received a start signal but water level recovered before the injection valves received all their open permissives. The injection valve logics require the low water level signal to be present at least until position switches sense that the



turbine steam admission valves have begun to open. The computer generated trip log confirms the low level two did occur for only a relatively short time. Hence, these systems performed as designed. The subsequent failure of RCIC was due to a malfunctioning pressure switch. This was repaired and the system returned to service prior to restart. The starting of the standby gas treatment (SBGT) system with no Group I isolation was investigated by the licensee. Low water level is the most probable cause of the SBGT actuation. However, this same level instrument also supplies a trip signal to the Group I isolation logic. The licensee believes that the water level transient below the double low level was so fast that the SBGT logic sealed-in had time to function but the seal-in of the Group I did not. Review of the logic components indicate additional contacts and larger relay coils exist in the Group I logic than in the SBGT logic. To verify correct operation of components which would normally actuate on double low level but did not, the licensee performed the functional surveillance tests on these systems.

Proper operation of the Group I function was verified by performance of MST PCIS21M. Proper operation of the ATWS (anticipated transient without scram) recirculation pump trip was verified by MST ATWS21M.

Unit 2 resumed power operation on September 5, 1985. The licensee plans to conduct additional testing on the SBGT and Group I isolation logics to accurately measure the time difference between the logics.

b. Hurricane Gloria

The center of Hurricane Gloria passed within 125 miles of the site. The hurricane caused no damage to plant systems or structures. Highest sustained winds for a 15 minute interval, 40.6 MPH at 300 feet and 21.2 MPH at 30 feet, occurred from 10 PM to 10:15 PM on September 26, 1985. The licensee shutdown Unit 2 as a precautionary measure. Unit 1 was in cold shutdown throughout the event. An Unusual Event (UE) was declared. The Technical Support Center (TSC) was activated even though activation was not required by the emergency plan.

The NRC activated the Incident Response Center (IRC) in Region II and sent additional personnel to the site. Radio communications were established between Brunswick and the IRC. Six NRC personnel were onsite during the hurricane.

Chronology

September 26, 1985

6:00 AM	National Weather Service (NWS) issues hurricane warning for area
6:32 AM	UE declared
8:16 AM	Commenced Unit 2 Reactor shutdown

12:02 PM	Unit 2 generator off-line
4:32 PM	TSC activated
5:59 PM	All rods in, Unit 2 in hot shutdown
10:15 PM	Maximum winds on-site

September 27, 1985

1:07 AM	Deactivated TSC
6:00 AM	NWS lifts hurricane warning for area
6:15 AM	UE terminated

c. Shedding of Two Loads on 4160 V Emergency Bus E-2.

On September 4, 1985 at 4:49 p.m., the 2D residual heat removal pump and the motor driven fire pump tripped while running. Some other loads which were running did not trip. Control Room personnel observed a momentary flash of the bus undervoltage annunciator. Investigation by the licensee indicates that the probable cause of the event was a momentary drop out of a relay in the bus load shedding circuit. Apparently the mechanical latching mechanism had been only marginally engaged, and some vibration allowed it to open before it reclosed again. Inspection of other similar relays revealed the same condition existed on some of these. The licensee is currently reviewing whether or not this might be a misapplication of the relay, GE 12HFA54E187H.

8. Main Steam Isolation Valve Solenoid Failures

Three Main Steam Isolation Valves (MSIV's) failed to close during required cold shutdown in-service testing (PT-25.1). Both valves in "C" loop (F022C and F028C) and the outboard valve in "A" loop (F028A) failed to close. The failure occurred at 11 PM on September 27, 1985. Preliminary evaluation points to a problem with the ASCO solenoid-operated air pilot valves Model No. NP8323A36E. The licensee has pulled all three solenoid valves from the MSIV's that failed to close plus the solenoid valve for a MSIV (F022A) which closed satisfactorily during testing.

Degradation of the ethylene propylene seats and O-rings was discovered upon valve disassembly. The F028C solenoid valve has been sent to ASCO for analysis. The remaining Unit 2 valves along with the apparent foreign matter discovered in the valves, and Unit 1 valves installed in 1983 and removed in 1984, have been sent to the Harris energy center for analysis.

This item will remain Unresolved pending problem resolution and further NRC follow-up: MSIV Solenoid Valve Failures (324/85-33-02).