



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

Report No. 50-325/88-15 and 50-324/88-15

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: April 1 - 30, 1988

Inspectors: P. H. Ruland 5/20/88  
Date Signed  
W. H. Ruland  
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Accompanying Personnel: S. Schaeffer

Approved by: P. E. Fredrickson 5/20/88  
Date Signed  
P. E. Fredrickson, Section Chief  
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, onsite review committee, in office Licensee Event Report (LER) review, followup on inspector identified and unresolved items, information meeting with local officials, plant startup from refueling, and onsite followup of events.

Results: One violation was identified - Improper change in operational condition during startup of Unit 2. Several examples of failure to follow procedure were included as part of the overall violation. Two unresolved items were identified: questions concerning procurement of commercial grade items for safety-related applications; questions concerning qualification of Victoreen Radiation Detector Cable.

A significant safety issue concerning cracking of silicon bronze bus bar bolts, first identified in Inspection Report 324,325/88-05, was inspected further.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- W. Biggs, Principal Engineer
- \*E. Bishop, Manager - Operations
- T. Canterbury, Mechanical Maintenance Supervisor (Unit 1)
- G. Cheatham, Manager - Environmental & Radiation Control
- R. Creech, I&C/Electrical Maintenance Supervisor (Unit 2)
- C. Dietz, General Manager - Brunswick Nuclear Project
- P. Dorosko, Administrative Supervisor
- W. Dorman, Supervisor - QA
- \*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. McKee, Supervisor - QC
- 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
- \*A. Richards, Project Engineer - QA
- \*S. Scharff, Operations Engineer
- \*J. Simon, Operations Engineer
- J. Smith, Manager - Administrative Support
- V. Wagoner, Director - IPBS/Long Range Planning
- 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 April 29, 1988, with those persons indicated in paragraph 1. The inspectors 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>
324/88-15-01	VIOLATION - Improper Change In Operational Condition (paragraph 11.b.(2))
325/88-15-02 & 324/88-15-02	*URI - Procurement of Commercial Grade Items Intended for Safety-Related Applications (paragraph 4.a)
324/88-15-03	URI - Qualification of Victoreen Radiation Detector Cable (paragraph 11.b.(1))
325/88-15-04 & 324/88-15-04	IFI - Failures of GE 305 Auxiliary Contact Adder Blocks (paragraph 12.a)
325/88-15-05	IFI - Normal Position for SW-V117, Nuclear Header to Vital Header Isolation Valve (paragraph 4.a)
325/88-15-06 & 324/88-15-06	IFI - Silicon Bronze Bolts in Safety-Related Switchgear (paragraph 12.b)

Note: Acronyms and abbreviations used in the report are listed in paragraph 13.

## 3. Followup on Previous Enforcement Matters (92702)

(CLOSED) Violation 325/87-20-04 and 324/87-20-04, Failure to Implement Procedures. The inspector reviewed the licensee's response dated September 25, 1987. The inspector verified that the licensee implemented the required corrective actions. All procedure documentation changes as well as procedure adequacy reviews were completed. In addition, for example b. of this violation, the inspector also interviewed selected engineering and training personnel and concluded that appropriate emphasis was placed on increased procedural training in the area of OP-19, High Pressure Coolant Injection System Operating Procedure, Section 5.3, Manual Startup.

\*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:

- o Oil changeout on HPCI booster pump - ticket 88-QMK205.
- o Troubleshooting efforts of F004, 1-SW-V117, F041 valves.
- o Troubleshooting efforts of Unit 1 Recirc. MG set field breaker.
- a. While watching oil changeout of Unit 1 HPCI booster pump on April 21, 1988, the inspector questioned licensee personnel as to which documents specified the lubricant type and what controls were in place to ensure that the proper lubricant was used. The inspector found that the oil type for this component is specified in OPM - LUB500ATT211. This document states that DTE 797 is the proper lubricant with an annual changeout requirement. The inspector then verified that DTE 797 was used and traced down the purchase order of the lubricant to determine how the lubricant was procured. The inspector noted that purchase order 3720588A, dated February 2, 1987, specified that the item be procured as an "Off the Shelf" item, which meant that the vendor was not required to be on the approved supplier's list. The receipt inspection performed on this purchase verified only that the part ordered matched the part received. No other quality requirements were specified.

ENP-42.2, Revision 1, dated January 6, 1988, Purchase Requisition and Data Base Review Procedure, defines a Q-OTS (Off the Shelf) item as a commercial grade item used in safety-related applications. ENP-42.3, Revision 1, dated January 6, 1988, Material Engineering Evaluation Procedure, Step 2.3.4, requires that a documented evaluation, which includes identifying the components critical characteristics, be performed, when it is decided to procure an item commercial grade

that is intended for safety-related applications. Step 7.2.9 of the same procedure requires that special receipt instructions, which should verify the component's critical characteristics, be specified. The inspector then questioned licensee personnel concerning why these requirements were not followed with respect to the DTE 797 oil as no documented engineering evaluation was found and no special receipt inspection requirements were noted. The licensee responded that these requirements only went into effect in October 1987, and that any items procured prior to this time would not have been subject to these procedures. However, the licensee was able to provide information to the inspector which showed the lubricant used in the HPCI booster pump to be of the proper type. The possibility exists though, that there are commercial grade items presently in stores intended for safety-related applications in which a proper engineering evaluation has not been performed. The licensee had previously identified programmatic procurement deficiencies in NCR No. A-87-023 which is still open. This item is Unresolved pending NRC review of the licensee's corrective action for the NCR: Procurement of Commercial Grade Items Intended for Safety-Related Applications, (325/88-15-02 and 324/88-15-02).

- b. On April 20, 1988, during maintenance surveillance testing, the licensee experienced a failure of 1-E41-F041, the HPCI Outboard Suppression Pool Suction Valve. Under accident conditions this valve is required to open on low CST level or high suppression pool level to provide an alternate suction path for HPCI. Troubleshooting revealed that the series field had been shorted to ground. No evidence of actuator or valve problems were found that may have caused the failure. The motor was then sent to Harris E&E for analysis.

It should be noted that the licensee has experienced other DC motor failures (see LER 1-87-23) and has committed to a followup report on the above LER by July 1, 1988, to explain any root cause of these motor failures. The inspectors will continue to followup on licensee activities in this area.

- c. On April 23, 1988, while performing maintenance activities on the Nuclear Service Water Vital Header, the Vital Header Motor Operated Isolation Valve, 1-SW-V117, failed to open when manually activated by the control switch. Under accident conditions this valve opens to provide Nuclear Service Water to the Core Spray Pump room cooling units, the RHR Pump room cooling units and to each RHR Pump Seal Cooling Heat Exchanger. Troubleshooting efforts by the licensee which included motor checks and control logic checks showed a limit switch problem. The contacts on limit switch rotor No. 1 were cleaned after which the valve was satisfactorily cycled from the RTGB and also with the remote keylock switch. The inspectors will

followup licensee activities with respect to their determination if the valve should be open rather than closed during normal operation. This is an Inspector Followup Item: Normal Position for 34-V117, Nuclear Header to Vital Header Isolation Valve (2008/28-15-07).

No significant safety matters, violations or 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:

PT-09.2	HPCI Operability Test
PT-10.1.3	RCIC System Operability Test - Flow Rates at 150 PSIG
PT-14.1A	Control Rod Coupling Check and CRD Testing
PT-14.3.1	Sequence Critical Shutdown Margin Calculation, Rev. 4
PT-20.8	Nitrogen Backup System Operability Test
PT-71.0	General Atomic Stack Radiation Monitor Channel Calibration

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 an 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.

The inspector found the limit switch cover not completely screwed down for valve 1-CAC-V7, the Inboard Suppression Pool Purge Exhaust Valve. This installation is not in accordance with the design drawings or normal installation practices which require the cover to be tightened sufficiently to ensure the "O" ring is seated. The licensee has generated NCR A-88-012 to track and resolve this issue. The inspector will continue to followup in this area in future routine inspections.

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

#### 7. Onsite Review Committee (40700)

The inspector attended pre-startup Plant Nuclear Safety Committee meeting 88-047 conducted on April 13, 1988. The inspectors verified that the meeting was conducted in accordance with Technical Specification requirements regarding quorum membership, review process, and personnel

qualifications. Meeting minutes were reviewed to confirm that decisions/recommendations were reflected in the minutes and followup of corrective actions was documented.

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

8. In Office Licensee Event Report Review (90712)

The listed LER was reviewed to verify that the information provided met NRC reporting requirements. The verification included adequacy of event description and corrective action taken or planned, existence of potential generic problems and the relative safety significance of the event.

(CLOSED) LER 1-88-09, Accidental Deenergization of Unit 2 Process Off-Gas Radiation Monitor and Reactor Building Ventilation Exhaust Radiation Monitors During Maintenance.

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

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

- a. (CLOSED) Unresolved Item 325/87-11-02, Mispositioned Equalizing Valve for 1B RHR/SW HX DPT. The inspector reviewed OER-87-20, approved on June 26, 1987, which adequately detailed the events concerning the mispositioned valve. The licensee has revised AI-58 and ENP-03 in order to improve clearance tag sheet verification as well as requiring independent verification in the acceptance test section of the plant modification, as opposed to BESU's past practice of taking credit for the clearance and/or system lineup at the completion of the unit outage. The inspector concluded that the root causes of the event have been identified and corrected, including action to prevent recurrence. Since the licensee has met all the conditions of 10 CFR 2, Appendix C, regarding licensee identified violations, no notice of violation will be issued.
- b. (CLOSED) Inspector Followup Item 325/86-24-05 and 324/86-24-05, Review RHR Room Cooler Operation. The inspector reviewed EER No. 86-0460, completed on July 24, 1987, which included detailed RHR Room Cooler Operation Analysis. The licensee has issued TSI-87-02, dated August 28, 1987, which provides operator instruction for administrative equivalent TS LCO implementation. The inspector has no further concerns with this issue.
- c. (OPEN) Inspector Followup Item 325/86-33-01 and 324/86-33-01, IRM Fuse Testing and Subsequent Required Modifications. The inspector reviewed the content and results of SP-86-068, Revision 2 (Unit 1), which was performed on January 19, 1987. The test results proved the concerns in GE SIL No. 445 were valid. SP-86-073 (Unit 2), was not run because the licensee concluded that plant modifications were



required. To assure pre-modification operability, SP-87-014 was performed on February 12, 1987, and verified that applicable portions of surveillance procedures MST-IRM11W and 12W would detect a blown -24 volt DC fuse (F2) in the IRM. EWR-04527 and PID No. 5400A have been issued and completed to develop the plant modification. The licensee plans to modify the system by December 8, 1989. The inspector concluded that the licensee's actions to address the SIL issues have been appropriate. This item will remain open pending completion of the modifications.

- d. (CLOSED) Inspector Followup Item 325/87-03-03, Review of 1MST-DG12R Procedure Violation OER. The inspector reviewed the licensee's OER-87-09, dated April 28, 1987, which addressed the root cause of the communication failure between the I&C personnel in charge of the test and the control operator. The licensee concluded that the test director had been given too many tasks. The DG Load Test MSTs 11R through 14R for Units 1 and 2 were revised on May 4, 1987, to incorporate lessons learned and a redistribution of the procedural steps to allow verifications to be done in other locations separate from the Control Room. The inspector concluded that the licensee's corrective actions were appropriate.
- e. (OPEN) Inspector Followup Item 325/87-03-04, Inadequate Board Walkdown and Review. The licensee has issued Standing Instruction 87-014, dated February 13, 1987, which requires the shift foreman or the shift operating supervisor to walk the Control Board with the respective control operator in order to double check RTGB indication and enhance SRO awareness of plant status. The licensee has also secured general business activity at the shift foreman window for an hour during shift turnover, to reduce distractions. The initial cause of the mispositioned valve has been corrected via procedure revision OP-17, Revisions 12 and 68, respectively, for Units 1 and 2. This item will remain open until the requirements specified in SI-87-014 are incorporated into the licensee's permanent procedures.
- f. (CLOSED) Inspector Followup Item 325/87-06-01, Review Motor-Driven Fire Pump Breaker Misalignment OER. The inspector reviewed the completed OER-87-10 and concluded that the root cause determination and corrective actions taken were appropriate. The licensee issued an LCO declaring the motor-driven fire pump inoperable for over 38 hours. No LCO Action Statement time limitation was exceeded during the event. The 4160 breaker misalignment occurred because OP-41, Fire Protection and Well Water System, was unclear. The positions in OP-41 have been revised as of May 19, 1987, to include a more specific description of normal breaker position. This problem appears to be unique at Brunswick to the motor-driven fire pump.
- g. (OPEN) Inspector Followup Item 325/87-06-02, Repair of Diesel Generator Exhaust Silencers. The inspector examined the rusted bottom of the exhaust silencers and does not consider the condition to adversely affect the operability of the diesels at this time. The

licensee plans to replace the silencers by December 1, 1988, to prevent any potential problems. This item remains open pending installation of the new silencers.

- h. (CLOSED) Inspector Followup Item 325/87-06-03, Documentation of Welding Associated with LER 1-84-02. The inspector was unable to obtain any information regarding additional welding records associated with the repair of the EHC. The inspector reviewed the as-is LER package which contained the EWRs, trouble tickets, design drawings, and certain portions of the welding documentation. Appendix B does not apply to the non-safety EHC system.
- i. (CLOSED) Inspector Followup Item 325/87-20-01 and 324/87-20-01, Enhancement of PID Tracking. The licensee has developed a PID tracking program which includes identification through acceptance milestones and the accompanying research of late items. The inspector reviewed DI-LRP-21, Revision 0, dated December 21, 1987, which provides the procedural documentation of the administrative controls relative to the PID tracking system, and found them to be adequate. The new system also identifies and tracks PIDs that have been accepted, but remain open for completion of the defined scope. Site procedure BSP-14, BSEP Project Identification, is currently being revised to incorporate the changes to the PID process. This revision is to be completed by June 30, 1988.

No significant safety matters, violations or deviations were identified.

#### 10. Information Meeting With Local Officials (94600)

The inspectors and the project section chief explained the NRC's role and inspection program to local officials. Meetings were held with members of the New Hanover County Commission on April 14, 1988, and with the Chairman of the Brunswick County Commissioners on April 15, 1988. The project section chief described the NRC inspection program to the City of Southport board of aldermen at their regularly scheduled monthly meeting on April 14, 1988.

The inspectors and section chief visited the local public document room at the University of North Carolina at Wilmington. The collection was well maintained and in order. The cognizant librarian stated that collection use averaged 1 person per month. The inspectors had no further questions.

#### 11. Plant Startup from Refueling - Unit 2 (71711)

The inspectors reviewed/observed activities associated with Unit 2 startup after the refueling outage to determine if activities were conducted in accordance with approved procedures. The inspection included a review of the changes to GP-01, Revision 105, Startup Checklist; direct observation of startup and approach to criticality; observation of selected

surveillance tests; review of licensee's drywell closeout inspection results with independent drywell inspection; examination of selected systems to assure startup readiness; and review of selected modification training packages.

a. Specific inspection items included:

(1) Training

During the refueling outage for Unit 2, the Alternate Rod Injection system was installed under PM-86-035 to comply with 10 CFR 50.62, the ATWS rule. The purpose of the ARI system is to initiate a reactor scram by a means independent of the Reactor Protection System. Four additional vent paths have been installed on the scram outlet valve air header, with each of the four vent paths consisting of two solenoid valves in series. The system is automatically initiated from ARI logic or can be manually initiated, if required.

The inspector reviewed the modification training package, sample examinations and examination test results to determine the adequacy and completeness of the training conducted for those operators licensed on Unit 2.

(2) Valve Lineups

The completed valve lineup sheets for the Control Rod Drive and the Standby Liquid Control System were reviewed to assess their completeness. In addition, the inspector physically verified the valve positions of the SLC system valves.

(3) Inspection

Several areas were inspected that are normally high radiation areas to look for housekeeping and general material conditions. The areas inspected included the HPCI roof, RCIC steam tunnel and the 66 foot penetration room.

(4) Drywell Closeout

The inspector reviewed licensee preparations for closing out the drywell. Administrative Procedure, AP-96, Drywell Closeout, was the governing procedure. The inspector reviewed those discrepancies identified by the licensee along with their corrective action. In addition, a physical inspection of the drywell was performed to verify that licensee actions were adequate.

b. Inspection findings were as follows:

(1) Victoreen Radiation Detector Cable

During the drywell inspection closeout, the inspector noted that the installed configuration of the Victoreen high range radiation monitor differed from the tested configuration as documented in Victoreen report 950.301. Specifically, the method of terminating the cable to the detector, the cable manufacturer and lack of a sealed conduit system for the detector cable, all differ from that which was tested. The termination method and use of a sealed conduit system by Victoreen in their test program was crucial to the successful completion of the test as evidenced by the numerous test failures experienced in previous testing without this configuration. The licensee did provide some information to the inspector describing the differences between their termination means and that which was tested and the specific measures taken to preclude moisture entry to the connector area. No information has been provided which demonstrates that the installed cable which is supplied by a different manufacturer and is not installed in sealed conduit, is acceptable for this application. This item is unresolved and is listed as Unresolved Item: Qualification of Victoreen Radiation Detection Cable, (324/88-15-03).

(2) Improper Change In Operational Condition

While observing startup preparations being made for Unit 2 startup on April 26, 1988, the inspector first noted at about 2:45 p.m. that the Reactor Mode Switch was in the Startup/Hot Standby position. Licensee personnel explained that the switch was in this position because of previous testing performed on the Rod Sequence Control System and the Rod Worth Minimizer and that it was left in this position because their procedures allowed this if reactor startup would commence shortly. The testing was completed at 9:45 a.m. Startup commenced at 4:00 p.m. A detailed sequence of events for both the control room personnel and the NRC inspector is contained in enclosure 2. This enclosure also addresses appropriate procedures and steps utilized during the evolution.

The Rod Worth Minimizer Periodic Test 1.6.2-2, Step 7.1.23, states to place the mode switch in SHUTDOWN unless the shift foreman verifies that the prerequisites are met for leaving the mode switch in START/HOT STANDBY pending reactor startup. The Rod Sequence Control System Operability Periodic Test 1.6.1, which was performed after the Rod Worth Minimizer Test, did not contain this step. At 9:45 a.m., following completion of the testing, the following prerequisites had not been met for startup:

- o RHR Division II not lined up for automatic LPCI initiation.

The "B" RHR loop was in the shutdown cooling mode at this time and not lined up for automatic LPCI initiation. At 2:03 p.m., the licensee stopped the RHR "B" pump to secure the shutdown cooling mode of RHR and line it up for LPCI initiation in accordance with Section 7.2 of OP-17. The licensee completed steps through B.4 in this procedure (starting recirculation pumps) at 2:53 p.m. Steps 5 through 16, which would have completed the restoration and lined up the system for automatic LPCI initiation, were not continued at this time. At 3:03 p.m., GP-1 was signed off by the SF and SOS stating that all prerequisites for startup had been met. A PA announcement was made that primary and secondary containment was in effect and that reactor startup was commencing. GP-2 was entered and steps 5.2.4, 5.2.5 and 5.2.6 were completed. The next step, step 5.2.7, states to withdraw control rods. At this time the NRC inspector noted that the RHR system had still not been restored. Specifically, he noted that the suppression pool suction valves F020B, F004B and F004D were shut. These valves do not receive an open signal during LPCI initiation. When questioned about this configuration, the SF directed his people to restore the lineup. Steps 7.2.B.5 through 16 of OP-17 were completed at 3:46 p.m. GP-1 was then signed off at 3:46 p.m. and reactor startup commenced at 4:00 p.m.

- o Nitrogen backup system inoperable.

The nitrogen backup system supplies a pneumatic source to selected safety-related loads. Following a LOCA and subsequent containment isolation, the normal air supply to the drywell will be isolated and supply will be from the nitrogen backup system to the suppression pool to reactor building vacuum breaker and the SRVs. This system was tagged out in accordance with the requirements of OG-3, Primary Containment Access Control, which describes the requirements for allowing personnel entry into the drywell. This procedure requires that RNA-SV-V5251 and RNA-SV-V5253 be closed and placed under SF clearance if the plant is in Condition 1, 2, or 3 or that the nitrogen backup isolation valves, RNA-V347 and RNA-V348 be tagged closed if the plant is in Condition 4 or 5. Clearance 2-1357B was hung at 4:25 a.m. on April 25, 1988, placing a tag on the control switches (closed) to 2-RNA-SV-V5251 and 2-RNA-SV-V5253. These valves supply air to the non-interruptible air header which supplies the SRVs. These valves open on loss of power. The plant was in Condition 1 at the time the clearance was hung.

Although the safety significance of this clearance being in effect during the mode change is small, since the plant was not at pressure and the SRVs were not required, the system was part of an active LCO (A2-88-0716) and should have been cleared prior to any mode change.

- o Primary Containment Airlock Door Surveillance Not Completed.

PT-2.6.6 was completed at 11:11 a.m. This test verifies that the drywell airlock is operable. It was necessary to perform this test since the airlock was previously made inoperable to support welding work performed in the drywell. During this mode change period, therefore, primary containment was not in effect as required by the plant's Technical Specifications.

This startup showed several examples of failure to follow procedures, e.g., signing off OP-1 before it was complete, not finishing OP-17, not following the instructions of PT-1.6.2-2. In addition, it showed an incorrect interpretation of their Technical Specifications regarding testing the Rod Worth Minimizer and the Rod Sequence Control System. The Technical Specifications, Section 3.1.4.1 and 3.1.4.2, state that "Entry into Condition 2 and withdrawal of selected control rods is permitted for the purpose of determining operability of the RWM (RSCS) prior to withdrawal of control rods for the purpose of bringing the reactor to criticality." The licensee interpreted this statement as allowing the mode switch to be placed in "startup" for testing purposes. This requirement addresses entry into Condition 2 which means that the prerequisites for meeting that mode change must be satisfied.

The licensee's position was that, although procedurally permitted, they would not have pulled control rods with the Division II RHR system not lined up for automatic LPCI initiation. During startup evolutions, the licensee stations an additional SRO in the control room to oversee startup activities. Although his tasks are not administratively defined, the licensee states that this individual was aware that the LPCI lineup had not been restored and he would have prevented pulling control rods without the system lined up for automatic initiation.

This matter is a Violation of the licensee's Technical Specifications: Improper Change In Operational Condition, (324/88-15-01).

One violation and no deviations were identified. A failure in the licensee's administrative control of startup prerequisites was identified.

## 12. Onsite Followup of Events (93702)

## a. Auxiliary Contacts in Motor Control Centers Breakers

GE has found a potential failure mode of an auxiliary contact block assembly used with contractors in safety-related motor control centers. The licensee had previously identified a problem with auxiliary contact blocks (CR-205 device) in early 1987 (see LER 1-87-01). The CR-205 devices were sticking, preventing motor-operated valve operation. The licensee replaced all CR-205 devices in important safety-related applications with a newer design CR-305 device which was not susceptible to the CR-205 failure mode. However, the licensee has found three sticking 305 devices since April 6, 1988; two failed during replacement installation. GE - Bloomington's initial assessment indicates that the manufacturing process was creating small burrs on the moving parts, resulting in the failures. GE has modified the process and slightly re-designed the part to fix the problem.

The licensee immediately inspected 133 important safety-related breaker compartments and verified that no installed 305 device was sticking. On April 29, 1988, in a conference call with Region II management, the licensee reported that they had again inspected (a week from previous inspection), 133 important safety-related breaker compartments and verified that no installed 305 device was sticking. In addition, they described their test program of the 305 devices being conducted jointly with General Electric. The testing began on April 28 to verify the failure rate of the old and new 305 devices. The testing results will determine if the licensee's intention to replace the old 305 devices with new 305 devices on an "as failed" basis or during preventative maintenance should be modified.

The inspectors will continue to follow the licensee's actions regarding auxiliary contractors. This is an Inspector Followup Item: Failures of GE 305 Auxiliary Contact Adder Blocks (325/88-15-04 and 324/88-15-04).

## b. Silicon Bronze Bolts in Safety-Related Switchgear

The licensee informed the inspector on April 19, 1988, that the broken and cracked bolts (see report No. 325,324/88-05) had failed due to intergranular stress corrosion cracking instead of excessive torque. This determination was made through metallurgical analysis conducted by the Harris E&E Center. The licensee, in a conference call with NRC personnel on April 29, 1988, stated that they would be replacing the 5/16 inch silicon bronze carriage head bolts with mild steel bolts in all safety-related electrical panels except the DC switchboards by May 17, 1988; the DC switchboard plan would be ready in 30 days. This is an Inspector Followup Item: Silicon Bronze Bolts in Safety-Related Switchgear (325/88-15-06 and 324/88-15-06).

No significant safety matters, violations or deviations were identified.

13. List of Abbreviations for Unit 1 and 2

AI	Administrative Instruction
AO	Auxiliary Operator
ARI	Alternate Rod Injection
ATWS	Anticipated Transient Without Scram
BESU	Brunswick Engineering Sub Unit
BSEP	Brunswick Steam Electric Plant
BSP	Brunswick Site Procedure
CO	Control Operator
CP&L	Carolina Power and Light Company
CRD	Control Rod Drive
CST	Condensate Storage Tank
DC	Direct Current
DG	Diesel Generator
DPT	Differential Pressure Test
E&E	Energy and Environmental
EER	Engineering Evaluation Report
EHC	Electro Hydraulic Control System
ENP	Engineering Procedure
ERFIS	Emergency Response Facility Information System
ESF	Engineered Safety Feature
EWR	Engineering Work Request
F	Degrees Fahrenheit
GE	General Electric
GP	General Procedure
HP	Health Physics
HPCI	High Pressure Coolant Injection
HX	Heat Exchanger
I&C	Instrumentation and Control
IE	NRC Office of Inspection and Enforcement
IFI	Inspector Followup Item
IPBS	Integrated Planning Budget System
IRM	Intermediate Range Monitor
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LOCA	Loss of Coolant Accident
LPCI	Low Pressure Coolant Injection
MG	Motor Generator
MST	Maintenance Surveillance Test
NCR	Non-Conformance Report
NRC	Nuclear Regulatory Commission
OER	Operating Experience Report
OP	Operating Procedure
OPM	Operating Procedure Manual
PA	Protected Area
PID	Project Identification
PM	Plant Modification



PNSC	Plant Nuclear Safety Committee
PSIG	Pounds per Square Inch Gauge
PT	Periodic Test
QA	Quality Assurance
QC	Quality Control
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RSCS	Rod Sequence Control System
RTGB	Reactor Turbine Gauge Board
RWM	Rod Worth Minimizer
RX	Reactor
SF	Shift Foreman
SI	Standing Instruction
SIL	Service Information Letter
SLC	Standby Liquid Control
SOE	Sequence of Events
SOS	Shift Operating Supervisor
SP	Special Procedure
SRO	Senior Reactor Operator
STA	Shift Technical Advisor
S/U	Startup
SW	Service Water
TS	Technical Specification
TSI	Technical Specification Interpretation
URI	Unresolved Item

ENCLOSURE 2

U-2 Startup Sequence of Events for 4/26/88

Initial Conditions: All rods in, Reactor temperature 180 degrees F, Reactor Coolant System depressurized with manual head vents open.

<u>Procedure Step</u>	<u>Time</u>	<u>Action</u>
	0435	Mode switch in S/U for testing PTs 1.6.1 and 1.6.1-2 (from CO's log)
	1041	PT-1.6.1 complete (RSCS - from SF log) (0945 from GP-1, Attachment 1)
	1046	PT-1.6.2-2 complete (RWM - from SF log) (0912 from GP-1, Attachment 1)
	1406	Secured Shutdown Cooling (from CO's log)
	1419	Drywell LCO cancelled (SF log)
	1430	NRC inspector asks U-2 SF about status of RHR Loop "B" and why it was not lined up for auto LPCI initiation. Informed by SF that procedure was in progress and that following start of "B" Recirc. Pump the lineup would be restored. (Note: OP-17, Step 7.2.b.4 shows this to be the correct sequence.)
	1445	NRC inspector asks U-2 SF why mode switch is in S/U. Informed that it was placed in that position earlier for testing and that their procedures allow them to keep it there if S/U expected shortly. (Note: Step 7.1.23 of PT-1.6.2-2 states to place mode switch in shutdown, unless the SF verifies that the prerequisites are met for leaving the mode switch in START-HOT STBY pending reactor startup.)
Step 7.2.B.4 of OP-17 Step 5.1.16 of GP-1	1453	Started 2B Rx Recirc. MG set (from CO's log)

<u>Procedure Step</u>	<u>Time</u>	<u>Action</u>
	1503	Primary and Secondary Containment in effect (CO's log)
	1503	GP-01 Startup Checklist complete (time later changed to 1546)
Step 5.1.13 of GP-1	1505	PA announcement that Primary and Secondary Containment in effect, commencing Rx S/U (from Chemistry log)
Step 5.2.4 of GP-2 5.2.5	1507	Verified Rx Vessel Shell temperature to right of criticality line (CO's log)
	1510	(After PA announcement) NRC inspector again asks about status of RHR "B" Loop. U-2 SF talks with U-2 operators and then flush begins on RHR "B" Loop per Step 7.2.B.5 of OP-17.
	1516	Commenced Reactor Startup (SF log, time later changed to 1600)
Step 5.2.6 of GP-2	1519	Chemistry informed of U-2 mode change to mode 2 at 1516 (time later changed to 1600 - Chemistry log)
	1530	When leaving Control Room, NRC inspector overhears SOS asking U-2 operators why rods are not being pulled. He was told that RHR flush was in progress, to which he asked, why can't one operator do the flush while the other pulls rods? The operators explained that the flush had to be done in order to restore the RHR "B" Loop for auto LPCI initiation and rod pull would begin after LPCI "B" was lined up.
Step 7.2.B.13 of OP-17 Step 5.1.15 of GP-1	1546	RHR B Loop in standby per OP-17 (CO's log)
Step 5.2.4 of GP-2	1559	Verified Rx Vessel Shell temperature to right of criticality line (CO's log)
Step 5.2.7 of GP-2	1600	Commenced Rx S/U, first Rod out (SF, CO's log)

APPLICABLE PROCEDURES

PT-1.6.2-2	Rod Worth Minimizer System Operability Test
PT-1.6.1	Rod Sequence Control System Operability.
OP-17	Residual Heat Removal System Operating Procedure
GP-01	Startup Checklist
GP-02	Approach to Criticality and Pressurization of the Reactor