



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

Report Nos.: 50-325/84-31 and 50-324/84-31

Licensee: Carolina Power and Light Company  
 411 Fayetteville Street  
 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: October 15 - November 30, 1984

Inspectors:	<u>P. E. Fredrickson Jr</u>	<u>12/28/84</u>
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	<u>P. E. Fredrickson Jr</u>	<u>12/28/84</u>
	L. W. Garner, Resident Inspector	Date Signed
	<u>P. E. Fredrickson Jr</u>	<u>12/28/84</u>
	T. E. Hicks, Resident Inspector	Date Signed
Approved by:	<u>P. E. Fredrickson Jr</u>	<u>12/28/84</u>
	P. E. Fredrickson, Section Chief (Acting)	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine, unannounced inspection entailed 367 inspector-hours on site in the areas of surveillance, maintenance, operational safety verification, ESF System walkdown, in-office Licensee Event Reports review, independent inspection, plant transients, refueling and startup, reactor shutdown margin determination and modification reviews.

Results: Of the areas inspected, 2 violations and 1 deviation were identified. (Inadequate Logic Functional Test, paragraph 7, Inadequate Modification Acceptance Test, paragraph 9, Deviation from the FSAR Safety Analysis, paragraph 10.)

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## REPORT DETAILS

### 1. Licensee Employees Contacted

- J. Boone, Engineering Supervisor
- L. Boyer, Director - Administrative Support
- \*J. Chase, Manager - Operations
- \*G. Cheatham, Manager - Environmental & Radiation Control
- J. Cook, Senior Specialist - Environmental & Radiation Control
- R. Creech, I&C/Electrical Maintenance Supervisor (Unit 2)
- \*C. Dietz, General Manager - Brunswick Nuclear Project
- \*W. Dorman, QA - Supervisor
- \*K. Enzor, Director - Regulatory Compliance
- W. Hatcher, Security Specialist
- A. Hegler, Superintendent - Operations
- \*R. Helme, Director - Onsite Nuclear Safety - BSEP
- \*M. Hill, Manager - Administrative & Technical Support
- \*B. Hinkley, Engineering Supervisor
- J. Holder, Manager - Outages
- P. Hopkins, Director - Training
- \*P. Howe, Vice President - Brunswick Nuclear Project
- L. Jones, Director - QA/QC
- R. Kitchen, Mechanical Maintenance Supervisor (Unit 2)
- J. Moyer, I&C/Electrical Maintenance Supervisor (Unit 1)
- D. Novotny, Senior Regulatory Specialist
- G. Oliver, Manager - Site Planning & Control
- \*J. O'Sullivan, Manager - Maintenance
- \*B. Parks, Manager - Technical Support (Acting)
- \*R. Poulk, Senior NRC Regulatory Specialist
- C. Treubel, Mechanical Maintenance Supervisor (Unit 1)
- L. Trip, Radiation Control Supervisor
- V. Wagoner, Director - IPBS/Long Range Planning
- J. Wilcox, Principle Engineer - Operations
- B. Wilson, Engineering Supervisor

Other licensee employees contacted included technicians, operators and engineering staff personnel.

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on November 29, 1984, with those persons indicated in paragraph 1 above. Meetings were also held with senior facility management periodically during the course of this inspection to discuss the inspection scope and findings.

### 3. Licensee Action on Previous Enforcement Matters

(Closed) Inspection Followup Items 325, 324/84-15-01, referenced in Inspection Report No. 84-15, indicated that the licensee's procedures for maintenance of limit torque motor operated valves, (MI-16-21, MI-16-21A), which included procedures for setting torque switches, was deficient in that for certain torque switches (SMB-00 operators), incorrect settings could be made without the technician realizing the error. In summary, these procedures have been revised to require that the valves be partially open prior to any torque switch setting adjustments, thus eliminating the problem. In addition, a random check of 10 torque switch settings was completed with no deficiencies. This item is closed.

### 4. Unresolved Item

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. One new unresolved item identified during this inspection is discussed in paragraph 7.

### 5. Review of Licensee Event Reports (92700)

The below listed Licensee Event Reports (LER's) were reviewed to determine if the information provided met NRC reporting requirements. The determination included adequacy of event description and corrective action taken or planned, existence of potential generic problems and the relative safety significance of each event. Additional in-plant reviews and discussions with plant personnel, as appropriate, were conducted for those reports indicated by an asterisk. These reports are considered closed.

#### UNIT 1

- 1-82-125 (3L) Issued to correct typing error. (Report as Diesel Supplement Generator No. 1 and Should have been No. 2.)
- 1-84-20 (3L) Automatic actuations of Control Building Emergency Air Filtration Train 3 caused by spurious fire alarms.
- 1-84-21 (3L) Automatic actuation of Control Building Emergency Air Filtration Train B caused a spurious fire alarms.
- 1-84-24 (3L) Failure to perform required sampling of Units 1 and 2 common main off-gas stack gaseous radioactive effluent within the specified sampling frequency.

No violations or deviation were identified.

## 6. Operational Safety Verification (71707, 71710)

The inspector verified conformance with regulatory requirements throughout the reporting period by direct observations of activities, tours of facilities, discussions with personnel, reviewing of records and independent verification of safety system status. The following determinations were made:

- Control Room Observations - The inspectors verified that control room manning requirements of 10 CFR 50.54, and the Technical Specifications were being 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 insure 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. In addition, the inspectors observed shift turnovers to verify that continuity of system status was maintained and also, questioned shift personnel relative to their awareness of plant conditions. The inspectors verified the status of selected control room annunciators and were assured that the control room operators understood the reasons why important annunciators were lit. In addition, periodic verifications were conducted to insure that corrective actions, if appropriate, were initiated and completed in a timely manner.

On October 16, 1984, while observing Unit 2 startup preparations, the resident inspector noticed that three local power range monitors (LPRM's), did not have any downscale trip light illumination as would be expected for shutdown reactor. This problem was reported to the control operators who quickly replaced light bulbs in the three downscale indications. Only two indications illuminated while the third did not. After observing the LPRM meter indication, it was discovered that the LPRM had, for no apparent reason, drifted up from its downscale reading. The LPRM, 30-28-37, was then taken out of service.

Also, during the aforementioned startup of Unit 2, it was discovered that the suction damper 2G-BFV-RB for the "B" train of standby gas treatment system (SBGT), was closed. The damper's normal position is open and was verified to be in its correct position prior to the startup by the licensee's procedures and was also checked by the resident inspector. The cause of the improper valve position has not been fully determined. It is believed that personnel in the vicinity of the local operator inadvertently caused that damper to close. The licensee has since installed plexyglass covers over the local controls to prevent recurrence. The train was not considered inoperable however, because this damper receives an open signal when the SBGT system is required to automatically start. Consequently, the damper was reopened and the startup continued. The capability to operate automatically was verified using special procedure SP-84-08. This

capability should have been verified every 18 months as per Technical Specifications Surveillance 4.3.2.2, but was not. This is discussed further in violation 324/84-31-02, and in the section covering surveillance testing.

- ESF Train Operability - Operability of selected ESF trains was verified by insuring that; each accessible valve in the flow path is in its correct position; each power supply and breaker, including control room fuses, are aligned for components that must activate upon initiation signal; removal of power from those ESF motor-operated valves so identified by TS is completed; there was no leakage of major components; there was proper lubrication and cooling water available; a condition did not exist which might prevent fulfillment of the train's functional requirements. In addition, instrumentation essential to system actuation or performance was verified operable by observing on-scale indication and proper instrument valve lineup, if accessible.
- Radiation Protection Controls - The inspectors verified that the licensee's health physics policies/procedures are being followed, including area surveys, RWP's, posting and calibration of selected radiation protection instruments in use.

On October 30, 1984, the resident inspector observed a post-accident sample station (PASS) drill for Unit 2 involving several health physics and chemistry personnel. While attempting to draw a liquid sample from a reactor coolant jet pump, the technician could not get the sample to inject into the sample bottle. It was later determined that a manual valve, 2-RXS-1774, was improperly closed during the PASS warm up cycle. This isolated the nitrogen supply to the pneumatically operated valves in the liquid sample section of the system. After the valve was properly aligned, a liquid sample was properly drawn. The licensee intends to modify their procedures to prevent a similar recurrence. Also, during the drill, a reactor building gaseous sample was drawn with no difficulties.

There were no violations or deviations observed.

- Physical Security Plan - The inspectors verified that the security organization is properly manned and that security personnel are capable of performing their assigned functions, that persons and packages are checked prior to entry into the protected area (PA), vehicles are properly authorized, searched and escorted within the PA, persons within the PA display photo identification badges, personnel in vital areas are authorized, that effective compensatory measure are employed when required, and that security's response to threats or alarms appears adequate.
- Plant Housekeeping - Observations relative to plant housekeeping identified no unsatisfactory conditions.



- Containment Isolation - Selected containment isolation valves were verified to be in their correct positions.
- Radioactive Releases - The inspectors verified that selected liquid and gaseous releases were made in conformance with 10 CFR 20 Appendix B and Technical Specification requirements.

No violations or deviations were identified.

#### 7. Surveillance Testing (61726)

The surveillance tests were analyzed and/or witnessed by the inspector to ascertain procedural and performance adequacy. The completed test procedures examined were analyzed for embodiment of the necessary test prerequisites, preparations, instructions, acceptance criteria and sufficiency of technical content. The selected tests witnessed were examined to ascertain that current, written approved procedures were available and in use, that test equipment in use was calibrated, that test prerequisites were met, system restoration was completed and test results were adequate. The selected procedures attested conformance with applicable Technical Specifications, they appeared to have received the required administrative review and they apparently were performed within the surveillance frequency prescribed.

The inspector employed one or more of the following acceptance criteria for evaluating surveillance tests.

10 CFR  
ANSI N18.7  
Technical Specifications

During the surveillance inspection, the following violation was identified:

On October 16, 1984, during a reactor startup, the suction damper 2G-BFV-RB for standby gas treatment system (SBGT) train B, was found out of its normal position and in the closed position. Operability of the system was not compromised however, because this valve, among other valves, receives an automatic open signal during SBGT automatic initiation. After investigation, it was determined that there was no surveillance procedure which adequately verified the automatic movement of this or other valves in the system which receive automatic actuation signals. This surveillance is required by Technical Specification (T/S) 4.3.2.2, which states that a logic system functional test be performed at least once per 18 months for isolation actuation instrumentation. According to T/S, this surveillance will include a test of all relays and contacts of the logic circuit from sensor output to activated device to ensure that components are operable. PT-2.1.2.7 was identified as the procedure which verifies this surveillance requirement but was shown to be inadequate. No procedure in place at any time verified that the suction and discharge valves for both SBGT train A and B, (B, C, E and G-BFV-RB), and the reactor building suction valves, (D, H-BFV-RB), open upon actuation by the drywell high pressure or the reactor

low-low water level instruments. This inadequate procedure constitutes a violation of Technical Specification 6.8.1.a (324/84-31-02). The licensee has since written a special procedure (SP-84-081), to make up for this deficiency and has adequately tested the system. A permanent revision to PT 2.1.27 is in progress which will satisfy the Technical Specification surveillance in the future.

After completing a followup for a similar problem on Unit 1, it was determined the Unit 1 has no automatic actuation capability for the SBT system suction and discharge valves which, based on this initial review, appeared to be contrary to the FSAR, the system descriptions and what is presently installed on Unit 2. Since these valves are administratively controlled in the open position, there is no immediate safety significance. The resident office will continue the review of this matter for potential enforcement action (UNR 325/84-31-02).

The Unit 2 2B standby air compressor (A/C) automatic start pressure switch (2-IA-PSC-3595), was found during routine calibration to be not functioning and was subsequently removed from the system leaving the 2B A/C with no auto start capability. The FSAR states that, if the non-interruptible instrument air (IAN) system pressure drops to < 95 psig, the two independent 19.5 scfm standby compressors are automatically started to maintain the IAN system pressure equal to or more than 95 psig. The licensee has not been able to find a replacement pressure switch and would have to perform a plant modification to install a suitable replacement. Instead, as part of separate modification package, the licensee intends to supply the necessary safety equipment, which previously required non-interruptible air, with nitrogen accumulators for their emergency pneumatic supply.

The FSAR states that the IAN is an essential system important to safety, and includes, as an integral part of the system's capabilities, the automatic start feature of the standby air compressors. To permanently remove this capability with no substitute would require an accident analysis and a change to the FSAR. The resident office will follow-up on the licensee's corrective actions in this area (IFI 324/84-31-03).

#### 8. Maintenance Observations (62703)

Maintenance activities were observed and reviewed throughout the inspection period to verify that activities were accomplished using approved procedures or the activity was within the skill of the trade and that the work was done by qualified personnel. Where appropriate, limiting conditions for operation were examined to ensure that, while equipment was removed from service, the Technical Specification requirements were satisfied. Also, work activities, procedures, and work requests were reviewed to ensure adequate fire, cleanliness and radiation protection precautions were observed, and that equipment was tested and properly returned to service. Acceptance criteria used for this review were as follows:

Maintenance Procedure  
Technical Specifications

Outstanding work requests that were initiated by the operations group for Units 1 and 2 were reviewed to determine that the licensee is giving priority to safety-related maintenance and not allowing a backlog of work items to permit a degradation of system performance.

No violation or deviations were identified.

9. Design Changes and Modifications (37700)

The inspector verified that the following modifications were reviewed in accordance with 10 CFR 50.59 and Technical Specification requirements, controlled as required by procedure ENP-03, contained appropriate references to FSAR specifications and commitments, and contained appropriate controls for special processes such as cable splicing. In addition, completed test records were reviewed and confirmed to be within established acceptance criteria and retesting, if necessary, was accomplished satisfactorily.

<u>Mod. No.</u>	<u>Title</u>
83-184	Modification of Drywell/Suppression Pool Vacuum Breakers
83-301	Service Air Line Seismic Relief
84-365	Reactor Building Standby Air Compressors Motor Replacement

No violations or deviations were found during this review. An additional modification (PM 83-262) was also verified for adequacy by reviewing a special surveillance report QASR 84-128 conducted by QA concerning this modification. PM 83-262 caused a radiation monitor addressed by Technical Specification 3.3.5.9, to be made inoperable.

Briefly, PM 83-262 was issued to move interferences associated with installation of a new off-gas system. One of the items which was relocated is 2-D12-F011, a three way solenoid valve which allows isolation of the steam jet air ejector (SJAE) radiation monitor sample chamber from the process stream and allows purging of the chamber with turbine building air.

On October 27, 1984, operations personnel observed that radiation readings of the off-gas stream did not appear to be responding as expected during the Unit 2 startup. Investigation revealed that the above-mentioned valve had been incorrectly installed such that the turbine building air was being sampled instead of the off-gas process stream.

Failure of PM 83-262 acceptance test to adequately require verification of correct performance requirements to the extent necessary to determine operability, is a violation of 10 CFR 50 Appendix B Criteria V (324/84-31-07).



QASR-84-128 also identified six non-conformance (NCR) and three concerns which must be addressed by plant personnel. The NCR's are summarized below.

<u>NRC No.</u>	<u>Description</u>
S-84-096	Solenoid was withdrawn from stores without required documentation.
S-84-097	Solenoid installed per modification after modification was declared operable.
S-84-098	Equipment was removed per modification for re-installation without addressing interim storage requirements.
S-84-099	Solenoid was incorrectly installed.
S-84-100	Existing solenoid model found to be different from "as built" drawing. Solenoid replaced without cause of condition being determined.
S-84-101	Qualitative acceptance test did not require adequate verification that system was operable.

Resolution of the NCR's will be an inspector followup item (324/84-31-08).

One violation was identified in this area.

#### 10. Control Building Emergency Ventilation System (CBEV) (92706)

Thus far, in 1984, 13 LER's detailing 30 events have been submitted on actuations of the CBEV. The number and nature of the actuations prompted the resident office and the licensee to investigate the causes and circumstances surrounding these reports. Out of the investigation, the resident office determined that the licensee's CBEV system had a significant deviation from the FSAR description and, also, that procedural documentation of emergency conditions associated with CBEV initiation specifically a large chlorine release, were vague and poorly placed. Details of the licensee's and the resident office efforts follow.

During a study of CBEV FSAR chapters, the resident office discovered that the CBEV, as installed and operated, did not match the description in section 6.4.2.2, Ventilation System Design, and section 9.4.1.3, Safety Evaluation of CBEV, in that only 2 chlorine detectors cause an isolation of the CBEV, not 4. Section 6.4.2.2 states that:

"Chlorine protection is provided by six chlorine detectors: two detectors are mounted at the Control Room air intakes; two detectors are attached to the wall of the service water intake structure immediately adjacent to the rail siding where the chlorine tank car is located; two

locations are inside or on the outer wall of Class I structures and are seismically protected. The detectors have a sensitivity of 1 part per million or better and a response time of less than 3 seconds.

Detection of high chlorine concentration in the chlorination building alarms in the Control Room and at the sensor location. Detection of high chlorine concentration at the tank car siding or in the Control Room air intake will alarm in, and automatically isolate the Control Room. Figure 6.4.2-2 illustrates the state of the Control Room HVAC system following isolation on a high chlorine signal. Isolation consists of closing the outside air makeup damper, termination of ventilation air to both the mechanical equipment room and cable spreading rooms, and stopping the Control Building exhaust fan. The emergency recirculation system fans do not operate during chlorine isolation, to prevent degradation of the charcoal filters by chlorine contamination."

The actual plant equipment is 6 detectors: 2 detectors in the Control Room air intake which, on high chlorine, will cause an isolation; 2 detectors mounted on uprights inside the service water building about 20 meters from the chlorine tank car, both of which are inoperable and neither of which is included in Control Room isolation logic; 2 detectors in the chlorination building which give local and remote alarms only.

The licensee's failure to upgrade the chlorine detection system as described in response to the original FSAR Appendix M, M14.5 questions, current FSAR section 6.4.2.2 is considered a deviation (DEV. 325, 324/84-31-03).

When the licensee was notified by the resident office of its findings, they immediately initiated compensatory actions to upgrade existing conditions. These actions included developing an operations department special instruction that, upon receipt of a high chlorine annunciator in the chlorination building, that the CBEV would manually be placed in its isolation configuration and a local visual verification, that power was available to the two remaining detectors that would cause an automatic isolation would be made on a per shift basis. Based on licensee action and the FSAR safety review, the inspectors verified and concurred with the compensatory actions.

The inspector found that although the system was not as described in the FSAR it did appear to comply with the applicable Technical Specifications. The associated Technical Specifications are 3.3.5.5, "Chlorine Detection System" and 3.7.2, "Control Room Emergency Filtration System". The surveillance requirement for the chlorine detection system operability, addresses only instrument X-AT-2977, which is assumed to mean 1X-AT-2977 for Unit 1 and 2X-AT-2977 for Unit 2.

The inspection also revealed that plant procedures surrounding a chlorine accident are vague and very general in nature. There did not appear to be any specific written procedure that described how to respond to a large chlorine release or the associated hazards and cautions. The need for these

procedures is addressed in both RG 1.95 and 1.78. The procedures reviewed included annunciator response procedures:

UA-28/5-1	CTL ROOM INTAKE AIR HI CHLORINE
5-2	CHLORINATION BLDG HI CHLORINE
6-2	CHLORINE LOADING AREA HI CHLORINE
Also: OP-43.1	CHLORINATION SYSTEM OPERATION
OP-37	CONTROL BUILDING VENTILATION OPERATING PROCEDURE
—	EMERGENCY RESPONSE PROCEDURES

The inspector did determine through interviews with licensee personnel that training had taken place regarding chlorine hazards. The licensee plans to change annunciator response procedures to caution operators that respiratory equipment should be considered on receipt of chlorine hazard alarms and consider a central specific procedure for response to a major toxic gas release. The resident office will follow the procedure enhancements as an inspector followup item (IFI 325, 324/84-31-05).

Licensee efforts continue at the close of the report period to reduce the number of challenges to the CBEV. These efforts include design change consideration as well as immediate actions of ensuring that smoke sensing devices are clean and properly functioning.

#### 11. RSCS Surveillance (61726)

While inserting control rods on 10-23-84, during shutdown operations on Unit 1, operations personnel realized that a Technical Specification surveillance requirement for the rod sequence control system (RSCS) could not be met. The resident office was notified and an investigation was immediately started. The unit remained at approximately 15% power for on-going reactor instrument penetration leak rate testing. No further rod movements were made in accordance with the action statement of T.S. 3.1.4.

The inspector reviewed T.S. 4.1.4.2, which states the RSCS shall be demonstrated operable, by attempting to select and move an out-of-sequence control rod in each of the other three rod groups and as soon as the RSCS is automatically initiated during control rod insertion when reducing thermal power. The surveillance test was a step within the routine shutdown procedure GP-05.

At the plant conditions stated, the control rod configuration was such that controlling group rods were in groups B12 and B34 with all A12 and A34 rods withdrawn completely from the core. The RSCS was enforcing rod movement in the group notch control mode. As such, group notch control requires that any rod in a group must be within one notch of companion rods in that group.

this mode does not prohibit selecting or moving rods in any of the controlling sub groups B12 or B34. It will initiate a rod select block on rods within groups A12 and A34. Reviewing the T.S., as stated earlier, it is clear that the RSCS, while functioning properly, could not satisfy the requirement. Inspectors reviewed the system descriptions and the Technical Specifications of RSCS's at other BWR's as well as the Standard Technical Specifications (STS), and determined that the Brunswick T.S. was deficient in that it failed to describe how to properly test the RSCS while in the group notch control mode. The surveillance described in the T.S. is valid only in the "Sequencing" mode of RSCS, i.e., when all group B12 and B34 rods are fully inserted (rod density at 50%), and rod motion for remaining group A12 or A34 begins. In the sequencing mode only rods with one of the two remaining major groups can be selected. All other groups are inhibited until insertion of the selected group is complete. The licensee's Technical Specifications need an additional surveillance similar to the STS which requires group notch control operability testing as described below:

The RSCS shall be demonstrated OPERABLE by:

- b. Attempting to move a control rod more than one notch as soon as the group notch mode is automatically initiated during:
  1. Control rod withdrawal for each reactor startup, and
  2. Power reduction

The licensee concurred with the inspector's finding that an additional Technical Specification surveillance should be added. The inspector shall follow the development and submittal of a T.S. change request for RSCS testing as an inspector follow-up item (IFI 325, 324/84-31-01).

The licensee developed a surveillance test and verified group notch control operability and added it as a step in GP-05. Unit 1 was later manually scrammed as allowed by GP-05 to facilitate lost time during the shutdown.

No violations or deviations were identified.

## 12. Plant Startup From Refueling (71711)

On October 16, 1984, the resident office observed the startup of Unit 2 which has been in a 32 week long refueling outage. The following items are among those verified:

- ° That the control rod withdrawal sequence and rod withdrawal authorization were available and a random check of surveillance tests required to be performed before startup were satisfactorily completed.
- ° That the startup was performed in accordance with technically adequate and most recently revised and approved procedures.
- ° That proper core-physics related tests were performed in accordance with technically adequate and approved procedures.

Observations made during the startup are included in paragraph 5 (Control Room Observations).

No violations or deviations were identified during the startup.

13. Onsite Review Committees (40700)

The inspectors attended the regular monthly Plant Nuclear Safety Committee (PNSC) Meeting and several special PNSC meetings conducted during the inspection period.

The inspectors verified the following items:

- Meetings were conducted in accordance with Technical Specification requirements regarding quorum membership, review process, frequency and personnel qualifications;
- Meeting minutes were reviewed to confirm that decisions/recommendations were reflected and follow-up of corrective actions were completed.

No violations or deviations were identified.