



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

Report Nos. 50-325/88-29 and 50-324/88-29

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: August 8 - 31, 1988

Inspectors: *W. H. Ruland* 10/3/88
 W. H. Ruland Date Signed
W. Levis 10/3/88
 W. Levis Date Signed

Accompanying Personnel: P. M. Madden

Approved by: *P. E. Fredrickson* 10/3/88
 P. E. Fredrickson, Section Chief Date Signed
 Division of Reactor Projects

SUMMARY

Scope: This routine safety inspection by the resident inspectors involved the areas of maintenance observation, surveillance observation, operational safety verification, followup on inspector identified and unresolved items, review of licensee operating experience report, and onsite review of licensee event reports.

Results: In the areas inspected, no programmatic weaknesses, significant safety matters, violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *K. Altman, Acting Manager - Maintenance
- W. Biggs, Engineering Supervisor
- F. Blackmon, Manager - Operations
- *J. Brown, Resident Engineer - Engineering
- T. Canterbury, Mechanical Maintenance Supervisor (Unit 1)
- *G. Cheatham, Manager - Environmental & Radiation Control
- R. Creech, I&C/Electrical Maintenance Supervisor (Unit 2)
- W. Dorman, Supervisor - QA
- *K. Enzor, Director - Regulatory Compliance
- *R. Groover, Manager - Project Construction
- *J. Harness, General Manager - Brunswick Nuclear Project
- W. Hatcher, Supervisor - Security
- *A. Hegler, Superintendent - Operations
- *R. Helme, Manager - Technical Support
- J. Holder, Manager - Outages
- P. Howe, Vice President - Brunswick Nuclear Project
- *L. Jones, Director - Quality Assurance (QA)/Quality Control (QC)
- *M. Jones, Director - On-Site Nuclear Safety - BSEP
- R. Kitchen, Mechanical Maintenance Supervisor (Unit 2)
- J. Moyer, Manager - Training
- G. Oliver, Manager - Site Planning and Control
- *J. O'Sullivan, Project Manager Valves - Projects
- B. Parks, Engineering Supervisor
- *R. Poulk, Project Specialist - NRC
- *J. Smith, Director - Administrative Support
- V. Wagner, Director - IPBS/Long Range Planning
- R. Warden, I&C/Electrical Maintenance Supervisor (Unit 1)
- 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

Note: Acronyms and abbreviations used in the report are listed in paragraph 10.

2. Followup on Previous Enforcement Matters (92702)

Not inspected.

3. 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-ABXC1	Cell 30 Replacement for Battery 2A-2.
88-AWNW1	Cell 30 Replacement for Battery 2A-2.
88-AXLY1	DG No. 3 Replacement of Woodward Motor Operated Potentiometer Motor.
88-AXPF1	CAC Pressure Buildup Coil Line Rupture Disk Replacement.
88-AXTN1	DG No. 1 Generator Rotor/Vendor Bulletin Re-alignment.

a. Diesel Generator Stator-to-Rotor Air Gap

During a review of the technical manual maintenance requirements, the DG maintenance engineer found that the stator-to-rotor air gap was not being checked. Consequently, while the No. 1 DG was out of service for its once/refueling cycle maintenance, the licensee measured the stator-to-rotor air gap for the 14 rotor poles at the 12 o'clock position. The gap was .186" for each pole, indicating no pole expansion had occurred. However, since the manufacturer's tolerance is .220" plus or minus .011, further measurements at other locations were taken. These additional measurements showed that the stator was misaligned with the rotor. General Electric, the generator manufacturer, told the licensee by phone that if a generator was run for a "long time" like that, overheating may occur, resulting in reduced generator life. However, since the generators have not been run for long periods, no adverse consequences resulted.

The licensee had checked DG No. 2 recently for pole distortion and found the air gap to be .220 at the 12 o'clock position. The

licensee plans to check DG Nos. 3 and 4 during the upcoming DG maintenance outage in September and October, 1988. The inspectors will review the results of those checks during future routine inspections.

The inspector concluded that the licensee's actions regarding this issue were appropriate.

b. Service Water Pump Motor Stator Temperatures

The licensee found that service water stator temperatures on the 1B Nuclear Service Water Pump were greater than 290 degrees F on August 6, 1988. The systems engineer reviewed the particular problem with the motor, and, based on the temperature versus lifetime curve supplied by the motor manufacturer (GE), determined that the motor was still operable. However, the licensee plans to upgrade the maintenance on the motors by sending each motor to GE - Atlanta for overhaul.

The systems engineer observed maintenance of a spare motor that had been previously installed in the 2B NSW location until late last year. GE discovered that the stator cooling ports were partially blocked with stator varnish. The motor had previously been rewound by GE in January, 1985. The licensee's proposed plan to overhaul each motor should correct any similar problems with the remainder of the motors.

The computer alarm setpoint for the pump motor stator was 302 degrees F, which was not reached by the 1B NSW pump. However, the licensee reports that the 302 degrees F setpoint is only appropriate for class "F" insulation. The licensee has had several service water pump motors re-wound in the past, and upgraded the insulation from class "B" to class "F". At the time of the inspection, the licensee did not know what the insulation class was for some of the motors, including that of the 1B NSW pump. The licensee has now lowered the alarm setpoint of the applicable computer points to 260 degrees F, compatible with class "B" insulation, until complete insulation information can be obtained.

The inspectors will continue to monitor the licensee's actions regarding the service water pump motors. The inspector has no concerns with the licensee's current actions. This is an Inspector Followup Item: Service Water Pump Motor Stator Temperature Resolution (325/88-29-01 and 324/88-29-01).

c. Diesel Generator Potentiometer Motor

While reviewing maintenance on the No. 3 DG governor assembly motor operated potentiometer, the inspector noted that the Woodward DG technical manual referenced Woodward Bulletin 03505. The licensee:

neither referenced Bulletin 03505 in procedure OPM-POT001, Preventive Maintenance for Woodward Motor Operator Potentiometer, Revision 0, February 17, 1988, nor was a copy available on site. The old style procedure MI-10-16A, replaced by the above PM, had referenced Bulletin 03505, which was and currently is an unapproved foreign print.

Bulletin 0350D, Speed Adjusting (Synchronizing) Motor Parts Catalog and Lubrication Guide, included specific lubrication recommendations for the speed adjusting motor. The licensee stated, in both the MI and PM, to add a few drops of oil to motor if needed. The instruction, while not the schedule recommended in the bulletin, appears adequate for the quite intermittent nature of the application. Further, the licensee is changing the motors to sealed bearing motors which do not require oil.

The inspector concluded that procedure OPM-POT001 was adequate without the licensee consulting the Woodward technical bulletin. However, the licensee has implemented the following corrective actions to improve the handling of imbedded references:

- ° Update the guidance to procedure writers in Maintenance Procedures Group Information Notice 86-030, Revision 2, Vendor Interface and Technical Manual Reviews.
- ° Review the circumstances with the procedure writers.

The inspectors have no further questions or concerns.

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

4. 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-BATT12R	Battery 1A-1 Operability Test.
1MST-RHR21M	RHR LPCI CSS HPCI High Drywell Pressure Trip Unit Channel Calibration.

2MST-RWCU21M RWCU High Differential Flow Trip Unit Channel
Calibration.

Unit 1 CO Daily Surveillance Report.

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

5. 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 ensuring 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.

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

6. Followup on Inspector Followup and Unresolved Items (92701)

- a. (OPEN) Inspector Followup Item 325/84-13-04 and 324/84-13-04, Completion of Plant Modification 82-030 and TAR B84-025 to Help Prevent Spurious Actuations of ECCS. The inspector reviewed licensee activities with respect to IFI 325, 324/84-13-04. This item was generated to followup on the completion of modification 82-030 for Unit 1 and the completion of the scope of work identified in TAR B84-025. The modification was initiated to prevent the spurious actuations of ECCS logic when voltage transients occurred on the DC bus. Inspection report No. 82-08 documents several examples where spurious actuations occurred. TAR B84-025 was initiated to further aid in system reliability by supplying ECCS initiation logic from two separate buses instead of a single battery bus.

Modification 82-030 was implemented during the Unit 1 1985 outage. This modification provided overvoltage protection for the battery chargers to trip the input breakers to the charger at 140.5 V to correct voltage spiking on the DC buses and subsequent spurious ECCS logic initiations. The items addressed by TAR B84-025 are now addressed by EWRs 84-807 and 84-809 and will be implemented by PCN 184809 and 284809 for Units 1 and 2, respectively. The implementation date has slipped several times due mostly to budget commitments as documented in memorandum C. R. Dietz to T. H. Wyllie, BSEP 86-0112 dated February 3, 1986, and in "Brunswick Nuclear Project Department, Summary of Reductions to 1988 Capital Budget Item 652", Project Control Nos. 84809B and 84809C. The present scheduled implementation date is January 12, 1990. This item will remain open until implementation of PCNs 184809 and 284809.

- b. (OPEN) Inspector Followup Item 325/86-05-02 and 324/86-06-02, Service Water System Technical Specification Discrepancy. TS 3.7.1.2 requires that "The service water system nuclear header shall be OPERABLE with at least three OPERABLE service water pumps." The nuclear header has only two pumps that will auto-start on a LOCA signal. The FSAR analysis requires only one pump to operate to supply cooling water to the diesel generators during the first ten minutes of a loss-of-offsite power/LOCA. Three conventional service water pumps can be manually aligned to the nuclear header. To address this discrepancy, the licensee has been working on a license amendment request for the service water system since the time of discovery. Due to the extended delay in the licensee's submission of

a TS change to correct the discrepancy, the inspector asked for a licensee commitment date. The Plant General Manager, during the exit meeting, committed to submit a TS amendment request for the service water system by December 31, 1988. This item will remain open until the amendment request is submitted.

- c. (CLOSED) Unresolved Item 325/86-11-06 and 324/86-12-06, Section XI Testing of SLC Pump Discharge Check Valves. Item 325/86-31-01 and 324/86-32-01, Review of Test Procedures for Exercising Dual Function Check Valves, which addressed the same issue, was closed in report Nos. 325,324/88-26. This item is closed based on that inspection.

7. Review of Licensee Operating Experience Report (61726)

The inspector reviewed licensee Operating Event Report 88-053, approved by PNCS on May 20, 1988, which addressed Unit 2 Core Spray Loop A time response testing concerns. The OER was reviewed to evaluate the adequacy of the licensee's method for self-identification of problems including root cause evaluation and proposed corrective actions to prevent recurrence.

While evaluating the results of a March 1988 performance of 2MST-CS39R, Core Spray Initiation Response Time Test, the licensee noted in their review of the test results from June 1986, that a value of 50 milliseconds was recorded for pump start time. A more typical number for this parameter is 1.3 to 2.0 seconds. Further review of the strip chart showed a perturbation in discharge pressure at 50 milliseconds but not a clear ramp increase in discharge pressure as evident in other traces. The maximum recorded response time, which included the 50 millisecond pump start time, was 25.53 seconds. Technical Specifications require a core spray response time of less than or equal to 27 seconds. The licensee further discovered that, if all the maximum allowable values were used for each component in the core spray response time loop, that the maximum value of 27 seconds would be exceeded. Therefore, to ensure that the 27 second time response value was not exceeded, the maintenance personnel were forced to update the total system response time each time maintenance was performed on any of the components rather than relying on the individual component's acceptance time. However, no mechanism was in place to ensure that the total system response time was updated.

In response to these concerns, the licensee will upgrade MST-CS39R to include expected time values for core spray pump start to 300 psig. The licensee has already revised OMMM-013, Maintenance Surveillance Test Users Guide, Revision 3, dated August 18, 1988, to specify the requirements for evaluating total system response time when ever work on an individual component is performed. Additionally, the licensee determined, with supporting analysis from General Electric, that a 31 second core spray

system response time was acceptable for the Unit 2 core spray system. The Unit 1 core spray system response time is currently under evaluation. When the results of that evaluation are complete, which is expected in November, the licensee will pursue a change to the plant Technical Specifications to allow for a greater response time. The inspector had no further questions in this area and will continue to review licensee OERs on a periodic basis.

No significant safety matters, violations or deviations were identified.

8. Onsite Review of Licensee Event Reports (92700)

The below listed LERs were 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. Onsite inspections were performed and concluded that necessary corrective actions have been taken in accordance with existing requirements, licensee conditions and commitments.

- a. (CLOSED) LER 1-87-03, Auto Isolation of Units 1 and 2 Common Control Building Heating, Ventilating, Air Conditioning System Due to Spurious Chlorine Detector Alarm. The licensee evaluation of this event determined that chlorine detector 2-X-AT-2977 spuriously actuated as a result of improper electrolyte solution drip flow from the detector orifice to the detector probe. The licensee's corrective action associated with this event consisted of cleaning the orifice, restoring the drip rate, and revising the auxiliary operator's daily surveillance instruction to require visual verification of the detector probe for coating of electrolyte. The inspector reviewed the licensee's documentation associated with this event and verified that WR/JO 87-ADIF1, which cleaned the orifice and calibrated the electrolyte solution drip flow rate for chlorine detector 2-X-AT-2977, was promptly initiated and detector operability was restored on February 3, 1987. In addition, the inspector verified that Revision 3 to licensee procedure OI-03.4 incorporated instructions for performing a visual verification of the detector probe for coating of electrolyte.
- b. (CLOSED) LER 1-87-04, Hourly Fire Watch of Units 1 and 2 Common Control Building Ventilation Room Performed Late. The hourly fire watch on elevation 70'-0" for the Unit 1 and 2 common control building ventilation supply/exhaust room was performed 26 minutes late. The licensee's evaluation of this event determined that the normal fire watch access route to this room was blocked by the turbine building crane. In addition, the licensee determined that the fire watch personnel were unfamiliar with alternate access routes to those areas requiring a fire watch. The licensee's corrective action consisted of improving the fire watch training program.

informing existing fire watch personnel that alternate routes to the control building ventilation room are available, and posting a warning sign on the door leading to the crane controls advising the operators not to block the control building ventilation room door with the crane. The inspector reviewed the licensee's documentation which implemented the corrective actions associated with this event. The fire watch training program, lesson plan FPB03B/FW-1, includes direction that the fire watch is responsible to ascertain from his foreman if any primary routes to tour areas are blocked and to report blocked routes to the foreman. In addition, this revision states the inspector also verified that the licensee provided training to all fire watch personnel with respect to the delayed fire watch to the control building ventilation room. This training was documented by memorandum dated February 10, 1987. This memorandum identified the alternate route to the control building ventilation room and was required to be read and signed by all fire watch personnel. The licensee also completed plant services work authorization 87-0516 on March 23, 1987, which installed a warning sign on the door leading to the crane controls. This sign, which was seen by the inspector, instructs the crane operator not to block access to the control building HVAC room.

- c. (CLOSED) LER 1-87-07, Auto Isolations of Units 1 and 2 Common Control Building Heating, Ventilating, Air Conditioning System Due to Spurious Chlorine Detector Alarms. The licensee determined that chlorine detector 2-X-AT-2977 spuriously actuated from momentary electrical changes in the detector sensor circuitry due to oxidation of leaked detector electrolyte solution. The detector leaked at the reservoir grommet seal and O-ring. The licensee replaced the grommet seal and O-ring in the affected detector. The inspector verified that the detector was in service and that the licensee made procedure changes to prevent recurrence. The inspector reviewed corrective maintenance procedure OCM-DET001, Revision 0, dated May 26, 1987, which the licensee implemented in response to this event. This procedure requires that the grommet seal and the O-ring be replaced every time the Wallace & Tiernan 50-125DI chlorine detectors are disassembled for maintenance.
- d. (CLOSED) LER 1-87-13, Isolation of Control Building Heating, Ventilating, and Air Conditioning System and Common Control Building Emergency Air Filtration System Due to Chlorine Leak. The licensee's evaluation of this event determined that the chlorine leak occurred as a result of a break in the underground supply line. The break in the line was attributed to corrosion (rust through) of the carbon steel pipe. The licensee, in response to this event, established: an engineering review to evaluate the corrosion process on the underground chlorine piping system and determine how to eliminate or reduce the corrosion to this system; implemented an inspection program for this system; and provided training to operations personnel on the effects of residual chlorine from underground chlorine leaks.

The inspector reviewed the licensee's documentation associated with their corrective actions. The licensee's engineering review is scheduled to be completed by December 30, 1988. The licensee has implemented a preventive maintenance procedure OPM-PPX502, Revision 0, dated July 31, 1987, Inspection/Replacement of Chlorine Tank Car Supply Line to Chlorination System. This procedure requires yearly replacement of the underground line. In addition, the inspector verified that the licensee, during their third quarter 1987 operations real time training sessions, discussed the effect of residual chlorine leaks. This training was conducted in accordance with course module OR87-3-1B, Chlorine Leaks, dated July 8, 1987. Also, the licensee revised their procedure OP-43.1, Chlorination System Operating Procedure, to incorporate general precautions and limitations with regard to notification of the nuclear shift foreman of any chlorination system operational system changes which could cause chlorine detector actuations.

- e. (CLOSED) LER 1-87-22, Automatic Isolation of Common Control Building Heating, Ventilating, and Air Conditioning System and Emergency Air Filtration System Due to Chlorine Leaks. This LER identified two chlorine related events. The licensee's evaluation of the event which occurred on December 12, 1987, determined that the flex seals associated with the pressure regulating valves for the chlorine system liquid evaporators experienced leakage and the December 26, 1987 event resulted from the piping flange union where the tank car is connected to the underground piping not being sufficiently tightened. The licensee rebuilt the pressure regulating valves and issued a procedure giving instructions on tightening the tank car flange. The inspector verified the flex seal replacement by reviewing the documentation associated with WR/JOs 88-AGKP1 and 88-AGKQ1 and verified that all associated work activities were completed by March 24, 1988. The inspector reviewed corrective maintenance procedure OCM-TK501, Chlorine Tank Car Changeout, Revision 0, dated February 26, 1988. The inspector verified that this procedure incorporated instructions which require the tank car flange connection to be evenly and securely tightened and that this connection be independently verified.

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

9. Exit Interview (30703)

The inspection scope and findings were summarized on September 1, 1988, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection finding listed below. During the exit interview, the Plant General Manager committed to submit a TS change for the service water system by December 31, 1988, (see paragraph 6.b.). 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, 324/88-29-01	IFI - Service Water Pump Motor Stator Temperature Resolution (paragraph 3.b).

10. List of Abbreviations for Unit 1 and 2

AO	Auxiliary Operator
BSEP	Brunswick Steam Electric Plant
CO	Control Operator
CSS	Core Spray System
DC	Direct Current
DG	Diesel Generator
ECCS	Emergency Core Cooling System
ESF	Engineered Safety Feature
EWR	Engineering Work Request
F	Degrees Fahrenheit
GE	General Electric
HP	Health Physics
HPCI	High Pressure Coolant Injection
HVAC	Heating, Ventilating, Air Conditioning System
I&C	Instrumentation and Control
IE	NRC Office of Inspection and Enforcement
IFI	Inspector Followup Item
IPBS	Integrated Planning Budget System
LER	Licensee Event Report
LPCI	Low Pressure Coolant Injection
MI	Maintenance Instruction
MST	Maintenance Surveillance Test
NRC	Nuclear Regulatory Commission
NSW	Nuclear Service Water
OER	Operating Experience Report
OI	Operating Instruction
OP	Operating Procedure
PA	Protected Area
PCN	Plant Change Notice
PM	Plant Modification
PNSC	Plant Nuclear Safety Committee
PSIG	Pounds per Square Inch Gauge
QA	Quality Assurance
QC	Quality Control
RHR	Residual Heat Removal
RWCU	Reactor Water Cleanup
SLC	Standby Liquid Control
STA	Shift Technical Advisor
TAR	Task Assistance Request
TS	Technical Specification
URI	Unresolved Item
V	Volt
WR/JO	Work Request/Job Order