



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

Report Nos.: 50-325/84-39 and 50-324/84-39

Licencee: 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: December 10 - 14, 1984

Inspectors:	<u>C. Julian for</u>	<u>2/14/85</u>
	W. K. Poertner,	Date Signed
	<u>C. Julian for</u>	<u>2/14/85</u>
	J. L. Caldwell	Date Signed
Approved by:	<u>C. Julian</u>	<u>2/14/85</u>
	C. A. Julian, Section Chief	Date Signed
	Operations Branch	
	Division of Reactor Safety	

SUMMARY

Scope: This routine, unannounced inspection entailed 68 inspector-hours on site in the areas of Unit 2 RHR water hammer event and vessel drain to the torus.

Results: Within the areas inspected, one violation was identified (Failure to follow procedure; see paragraph 5.b).

REPORT DETAILS

1. Persons Contacted

Licensee Employees Contacted

- *C. Allen, Regulatory Compliance
- *S. Dimmette, Assistant to Vice President
- *W. Leonard, Operations Engineer
- *C. Blackmon, Operations Superintendent
- *M. Hill, Technical Support
- *J. Chase, Operations Manager
- *E. Scarff, Operations Engineer
- *J. O. Sullivan, Maintenance Manager
- *L. Boyer, Director-Administrative Support
- *J. McKee QC Supervisor
- *L. Jones Director QA/OC
- *A. Cheatham, Manager EGRC
- *W. Hatcher, Security Specialist
- *D. Novotny, Regulatory Compliance
- *B. Hinkley, Technical Support
- *A. Hegler, Radwaste Supervisor

Other licensee employees contacted included operations, maintenance and engineering personnel.

NRC Resident Inspectors

- D. Myers
- L. Garner
- *T. Hicks

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on December 14, 1984, with those persons indicated in paragraph 1 above.

In a telephone conversation on February 1, 1985, the inspector informed the plant manager that as a result of Region II's review of the report details presented in paragraph 5, one issue concerning failure to implement proper controls had been determined not to be a violation and will be identified as an inspector followup item. The issue should be addressed by the licensee in its response to this inspection report.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Unit 2 RHR Water Hammer Event and Vessel Drain to the Torus

On November 28, 1984, an event was reported at Brunswick Unit 2 under 10 CFR 50.72. The event included a water hammer event on the RHR steam condensing line and a vessel drain to the torus while attempting to place the unit into the shutdown cooling mode of operation. On December 10-14, 1984, an inspection team composed of two individuals from Region II visited the Brunswick Nuclear Plant in order to evaluate this event.

a. Background

On November 27, 1984, with Unit 2 at approximately 90 psi, operations commenced section 5 of OP-17 (Residual Heat Removal System Operating Procedure) to place the unit into the shutdown cooling mode of operation. RHR loop "A" was selected as the loop of RHR to be put in the shutdown cooling mode due to the fact that the "B" loop of RHR was technically inoperable because the injection valve had been leaking and both the inboard and outboard injection valves had been electrically de-energized.

The "B" loop of RHR is normally used when placing the RHR system in the shutdown cooling mode of operation. Using the "B" loop of RHR allows the flushing of the RHR system to be directed to the Radwaste system in lieu of the torus as required when using the "A" loop of RHR for shutdown cooling.

OP-17 required that system flushes be conducted prior to entering the shutdown cooling mode of operation. The purpose of these flushes is to warm-up the RHR system piping and to ensure that the conductivity of the RHR system is less than 10 umho/cm. The first flush consists of bypassing the LPCI injection check valve, opening the LPCI inboard injection valve E11-F015A and RHR HX 2A drain to the suppression pool E11-F011A. The RHR HX 2A Level controller is then used to throttle open E11-LV-F053A to commence flushing the RHR HX discharge piping to the suppression pool. This evolution commenced at approximately 2000 hours at which time a water hammer event was observed by a health physics technician and reported to the control room. Water hammer is not considered an unusual event at Brunswick when placing the RHR system into shutdown cooling and cursory inspection by an auxiliary operator did not detect damage to any piping or supports. The flush of the RHR HX discharge piping continued until the following shift at which time the discharge line flush was secured and a flush of the RHR pump suction lines was commenced. The flush of the suction lines consists of opening shutdown cooling isolation valve E11-F009, throttling open shutdown cooling isolation valve E11-F008 and then throttling open E11-F053 to commence the flush to the suppression pool. This evolution commenced at approximately 0130 hours November 28, 1984.

However, when E11-F008 was throttled open, reactor vessel water level decreased rapidly which resulted in a reactor scram and a group 2, 6 and 8 isolation. Reactor vessel level was restored, the RHR system was filled and another attempt was made to flush the suction lines. As E11-F008 was throttled open a vessel level decrease was noted and F008 was shut. Level was restored and a third attempt was made to flush the lines. This attempt also resulted in a rapid vessel decrease and F008 was shut. A trouble ticket was processed on E11-F053 and the shift continued in OP-17 to place RHR loop "A" in the shutdown cooling mode of operation without further flushing. The "A" loop of RHR was placed into shutdown cooling at approximately 0530 November 28, 1984. Further investigation into the event revealed E11-F053 had been full open during the flushes rather than closed as thought and that 15 of 19 pipe supports on the steam condensing line between E11-F052 and the RHR HX had been damaged due to water hammer.

E11-F053 is an air operated valve and has a complicated control system. The valve can be controlled by either RHR heat exchanger level (controller E11-LIC-R604A) or RCIC suction pressure (controller E11-LIC-R606A). The signal used to control the position of E11-F053A is determined by controller E11-SS-F605A. E11-SS-F605A normally receives both the level controller signal and the pressure controller signal and then outputs the lower of the two signals. This signal then controls the position of E11-F053. While troubleshooting the operation of E11-F053, it was determined that E11-SS-F605A was taking the two input signals (E11-LIC-R604A and R606A) and outputting the higher of the two signals. Further troubleshooting revealed that the output jack of controller E11-SS-F605A was plugged into the HI value position as opposed to the LO value position as required. With E11-SS-F605A passing the high value, F053A received an open signal when air was supplied to the valve due to the fact that the RCIC suction pressure controller E11-LIC-R604A had been placed in automatic with the setpoint tape set at a value greater than RCIC suction pressure to allow the operator to use the RHR HX level controller to control the position of E11-F053A. E11-F053A has no position indication in the control room; therefore the operator had no means of determining the position of the valve other than the demand signals from the controllers. The only indication in the control room that could have alerted the operator of a problem was heat exchanger level. This indicator was later determined to have been out of commission and pegged high during the event.

b. Failure to Follow Written Approved Procedures

Section 5 of OP-17 requires that the RHR HX outlet temperature be within 110°F of reactor vessel water temperature and that conductivity of the RHR system be less than 10 umho/cm prior to securing the RHR HX downstream piping flush and continuing in OP-17 with the RHR pump upstream piping flush. The RHR HX outlet conductivity cell was out of commission and chemistry was unable to obtain a water sample from the sample line. When the sample valves were opened, air appeared to be drawn into the RHR system and no flow was observed. Due to the fact

that a water sample could not be obtained from the sample line the shift foreman marked the step "NA" and continued with the procedure. These same requirements are required prior to securing the RHR pump upstream piping flush and continuing into the shutdown cooling mode of operation.

Technical Specification 6.8.1.a requires written procedures be implemented covering procedures recommended in Appendix A of Regulatory Guide 1.33, November 1972. Item A.4 of Appendix A requires procedures be established for procedure adherence and temporary change method.

Section 4.1 of OI-01, Operating Principles and Philosophy, states: "Procedure compliance is mandatory".

Section 4.3.1.3 of OI-01 states: "An Operator may omit a step only if the step is applicable under a given condition as described in the step and is determined to be inapplicable by the operator, or if only a given portion of a procedure is required to be completed (i.e., performance of only a portion of a periodic test is required to satisfy a given PMTR)."

Contrary to the above, the licensee failed to implement procedure OI-01, in that while performing section 5 of OP-17 on November 27-28, 1984, a water sample was not obtained from the RHR system to verify that the conductivity of the RHR system was less than 10 umho/cm as required by OP-17 section 5 steps 17 and 41. The steps were marked "NA" and the evolution continued. This is a violation (50-324/84-39-01).

c. Controller E11-SS-F605A Output Plug in Wrong Position

The root cause of the water hammer and vessel draining event was determined to be that the output signal of controller E11-SS-F605A was selected to the HI jack as opposed to the LO jack as required for the procedure to perform its intended function. Controller E11-SS-F605A was last calibrated on May 5, 1984, at which time records show that the output signal followed the lower of the two input signals as required. For the output of the controller to be switched from the LO position to the HI position, the controller had to be opened up and the output plug unplugged from the LO position and then plugged into the HI position. Investigation by the licensee to determine how the output plug could have been moved provided no explanation. No documentation could be found that performed additional work on the controller.

The inspectors expressed a concern about the apparent lack of adequate controls established concerning manipulations of the output jack of controller E11-SS-F605A. No maintenance or operational procedure could be identified that manipulated the output plug and whatever caused the movement of the plug from the LO position to the HI position did not ensure return of the plug to its proper position. In a telephone conversation February 1, 1985, the inspector informed the plant manager that this issue should be addressed by the plant in its response to

this inspection report. This item will be identified as an Inspector Followup Item (50-324,325/84-39-02).