



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

INTERIM SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO GENERIC LETTER 83-28, ITEMS 3.1.1,

3.1.2, 3.2.1, 3.2.2 AND 4.5.1

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

DOCKET NOS. 50-325 AND 50-324

## 1.0 Introduction

In February 1983, the Salem Nuclear Power Station experienced two failures of the reactor-trip system upon the receipt of trip signals. These failures were attributed to Westinghouse - Type DB-50 reactor-trip system (RTS) circuit breakers. The failures at Salem on February 22 and 25, 1983, were believed to have been caused by a binding action within the undervoltage trip attachment (UVTA) located inside the breaker cubicle. Due to problems of the circuit breakers at Salem and at other plants, NRC issued Generic Letter 83-28, Required Actions Based on Generic Implementations of Salem Anticipated Transient Without Scram (ATWS) Events, dated July 8, 1983. This letter required the licensees to respond on immediate-term actions to ensure reliability of the RTS. Actions to be performed included development of programs to provide for post-trip review, classification of equipment, vendor interface, post-maintenance testing, and RTS reliability improvements. The Generic Letter stated that for Actions 3.1.1., 3.1.2, 3.2.1, 3.2.2, 4.1, and 4.5.1, NRC Regional Offices would perform a post-implementation review and issue Safety Evaluations (SE). This evaluation is the Interim Regional SE for Brunswick Units 1 and 2 and includes the results of Region II's review of the licensee's submittals to Generic Letter 83-28. A Regional inspection was conducted at the Brunswick facility during May 20-24, 1985, to review the licensee's current program, planned program improvements, and implementation of present procedures associated with post-trip review, equipment classification, vendor interface, surveillance and post-maintenance testing, and reactor-trip system reliability. The details of the inspection findings are discussed in Inspection Report No. 325, 324/85-14.

## 2.0 Review Guidelines

The licensee's response dated November 7, 1983, was evaluated for compliance to the NRC staff's positions delineated in Generic Letter 83-28 for Action Items 3.1.1, 3.1.2, 3.2.1, 3.2.2, 4.1 and 4.5.1. Item 4.1 is not applicable to Brunswick 1 and 2, therefore, a response was not required. The requirements of the above action items as described in Generic Letter 83-28 are paraphrased below:

### 3.1. POST-MAINTENANCE TESTING (REACTOR TRIP SYSTEM COMPONENTS)

#### Position

1. Licensees and applicants shall submit the results of their review of test and maintenance procedures and Technical Specifications to assure that post-maintenance operability testing of safety-related components in the RTS is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.
2. Licensees and applicants shall submit the results of their check of vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the Technical Specifications, where required.

### 3.2 POST-MAINTENANCE TESTING (ALL OTHER SAFETY-RELATED COMPONENTS)

#### Position

The following actions are applicable to post-maintenance testing:

1. Licensees and applicants shall submit a report documenting the extending of test and maintenance procedures and Technical Specifications review to assure that post-maintenance operability testing of all safety-related equipment is required to be conducted and that the testing demonstrates that the equipment is capable of performing its safety functions before being returned to service.
2. Licensees and applicants shall submit the results of their check of vendor and engineering recommendations to ensure that any appropriate test guidance is included in the test and maintenance procedures or the Technical Specifications where required.

### 4.1 REACTOR TRIP SYSTEM RELIABILITY (VENDOR-RELATED MODIFICATIONS)

#### Position

All vendor-recommended reactor trip breaker modifications shall be reviewed to verify that either: (1) each modification has, in fact, been implemented; or (2) a written evaluation of the technical reasons for not implementing a modification exists.

For example, the modifications recommended by Westinghouse in NCD-Elec-18 for the DB-50 breakers and a March 31, 1983, letter for the DS-416 breakers shall be implemented or a justification for not implementing shall be made available. Modifications not previously made shall be incorporated or a written evaluation shall be provided.



#### 4.5 REACTOR TRIP SYSTEM RELIABILITY (SYSTEM FUNCTIONAL TESTING)

##### Position

On-line functional testing of the reactor trip system, including independent testing of the diverse trip features, shall be performed on all plants.

1. The diverse trip features to be tested include the breaker undervoltage and shunt-trip features on Westinghouse, Babcock and Wilcox (B&W) and Combustion Engineering (CE) plants; the circuitry used for power interruption with the silicon-controlled rectifiers on B&W plants and the scram pilot valve and backup-scram valves (including all initiating circuitry) on General Electric (GE) plants.

#### 3.0. Evaluation and Conclusion

By letter dated November 7, 1983, Carolina Power & Light Company, (CP&L or the licensee), provided information regarding its compliance to Sections 3.1, 3.2, and 4.5 of Generic Letter 83-28 for Brunswick, Units 1 and 2. We have evaluated the licensee's responses against the NRC positions described in Section 2.0 above for completeness and adequacy. We concluded that the licensee's response to items 3.1.1 and 4.5.1 are acceptable. The licensee's actions in regard to items 3.1.2, 3.2.1, and 3.2.2 are still in-process and have not been completed; therefore, the acceptability of these items cannot be determined without the additional information from the licensee which is identified in Enclosure 2 to the transmittal letter for this SE.

Delineated below are the results of the Region II evaluations and a brief summary of the licensee's responses:

##### A. Item 3.1.1 - Test and Maintenance Procedure Review (Reactor Trip System Components)

The licensee has reviewed the post-maintenance testing program being implemented at Brunswick Plant and confirmed that procedures governing the preventative and corrective maintenance program specify that testing be performed following maintenance on safety-related components in the Reactor Protection System. In addition, the licensee has reviewed its surveillance test and maintenance procedures and Technical Specifications associated with the Reactor Protection System and confirmed that the testing required adequately demonstrates that the equipment is capable of performing its safety functions prior to being returned to service. We have reviewed the licensee's response and have concluded that the licensee's response to this item is acceptable and meets the intent of Generic Letter 83-28.

B. Item 3.1.2 - Check of Vendor and Engineering Recommendations for Testing and Maintenance (Reactor Trip System Components)

The licensee has evaluated General Electric Service Information Letters (SILs) associated with the Reactor Protection System and verified that they have been properly evaluated and, where appropriate, incorporated the information into test and maintenance procedures. The results of the licensee's reviews indicated that three SILs had not been implemented. These SILs are identified as follows:

SIL-308, CR105D and/or NEMA 2 Contactor Binding

SIL-360, CR2940 Tandem Block Switches

SIL-155, Inspection and Cleaning of General Electric Type SMB Control Switches (Affects only Unit 2)

Subsequent to the above review, the licensee evaluated the above SILs for corrective action and determined that SIL-308 must be implemented during the current outage and SILs 360 and 155 should be implemented during the next refueling outage. The licensee further states in its response that a check of vendor and engineering recommendations other than GE SILs is in progress and the final results will be submitted to NRC in a supplemental response. The licensee's preliminary plans were to submit its completion schedule to the NRC by September 1984. We cannot complete our evaluation of this item until the licensee submits the results of its final review.

C. Item 3.2.1 - Review of Test and Maintenance Procedure and Technical Specifications (All Other Safety-Related Components)

The licensee states in its response that a review of procedures and Technical Specifications will be performed to verify that testing is required after maintenance to demonstrate that safety-related equipment is capable of performing its safety functions prior to it being returned to service. This review action is scheduled for completion by August 1985. The licensee further states that once the review is completed a supplemental response will be submitted to NRC. We concur with the licensee's plans for reviewing test and maintenance procedures and Technical Specifications to assure that post-maintenance operability testing of all safety-related equipment is required to be conducted. However, this item cannot be completely evaluated until the licensee's final response is submitted to NRC with the results of its reviews.

D. Item 3.2.2 - Check of Vendor and Engineering Recommendations for Testing and Maintenance (All Other Safety-Related Components)

The licensee states in its response that an assessment of safety-related vendor and engineering recommendations is planned and should



be completed by December 1985. The licensee stated that it will submit the results of its review in a supplemental response. We concur with the licensee's plans and schedules for completing its review of vendor and engineering recommendations for testing and maintenance; however, this item cannot be completely evaluated until we receive the results of the licensee's assessment.

E. Item 4.1 - Reactor Trip System Reliability (Vendor-Related Modification)

This item is applicable only to pressurized water reactors, therefore, no response is required by Brunswick since it is a boiling water reactor.

F. Item 4.5.1 - Reactor Trip System Reliability (System Functional Testing)

The licensee states in its response that on-line testing of the Reactor Protection System is accomplished by periodic functional channel tests, channel checks, and scram timing of control rods. However, the licensee further stated that on-line testing of the backup scram valves is not feasible due to the design of the plant. Below is a description of the backup scram function and the licensee's justification for not performing on-line testing:

The backup scram function is accomplished by two air operated solenoid valves which isolate the main air supply and vent the scram air supply header which connects to the individual hydraulic control units. The backup scram valves are redundant valves with redundant trip signals from both Reactor Protection System logics A and B. The logic is diverse from the primary Reactor Protection System since the backup scram valve solenoids are energized and DC powered to trip versus the primary scram pilot valves which are deenergized to trip and are AC powered.

Although one-half of the backup scram logic is actuated for each valve during channel functional tests, the only time the backup scram solenoids are actuated is when a complete scram signal is initiated. These valves cannot be tested on-line without scrambling the plant. The licensee further stated that an independent test of each backup scram solenoid valve during each refueling outage is sufficient to assure the reliability of the Reactor Protection System for the following reasons:

1. The backup scram function was incorporated as an additional improvement in response to an already extremely remote event.
2. The backup scram function has been designed to be highly reliable by use of redundant valves and actuating logic.

3. Testing during operation would require a plant scram.
4. The primary scram pilot valve solenoids which are normally energized and tested frequently are diverse to the backup scram solenoids which are normally deenergized and not cycled frequently. Due to the lower testing frequency of the backup scram valves, the potential for a common cause failure or human error affecting the primary and backup Reactor Protection System is reduced.

We have reviewed the licensee's reasons and find that on-line scram testing of the backup scram valves will not increase the reliability of the Reactor Protection System. Therefore, the licensee's planned testing program is satisfactory. Based on our review, we find the licensee's response to this item is acceptable.

G. Conclusion

Based on our review, we conclude that the licensee's submittals to items 3.1.2, 3.2.1 and 3.2.2 are incomplete and additional information, as described in Enclosure 2 to the transmittal letter for this SE, needed for us to complete our evaluation. We will review the responses to the Request for Additional Information when received and will report our findings in a supplement to this Interim Safety Evaluation. Items 3.1.1 and 4.5.1 were determined to be acceptable and meet the intent of Generic Letter 83-28.

Principal Contributor: K. Landis

Dated: July 1, 1985

REQUEST FOR ADDITIONAL INFORMATIONBRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2GENERIC LETTER 83-28, ITEMS 3.1.2, 3.2.1, AND 3.2.2

- B. Item 3.1.2 - Check of Vendor and Engineering Recommendations for Testing and Maintenance (Reactor Trip System Components)

In the November 7, 1983 response, Carolina Power & Light Company (CP&L) stated that a check of vendor and engineering recommendations other than General Electric (GE) Service Information Letters (SILs) is in progress and the final results will be submitted to the NRC in a supplemental response. The preliminary plans were to submit the completion schedule to the NRC by September 1984. We cannot complete our evaluation of this item until CP&L submits the results of its final review. A statement confirming that this action has been completed or a schedule for completing the final review is requested.

- C. Item 3.2.1 - Review of Test and Maintenance Procedure and Technical Specifications (All Other Safety-Related Components)

CP&L stated in its response that a review of procedures and Technical Specifications will be performed to verify that testing is required after maintenance to demonstrate that safety-related equipment is capable of performing its safety functions prior to it being returned to service. This review action is scheduled for completion by August 1985. CP&L further stated that once the review is completed a supplemental response will be submitted to the NRC. We concur with the licensee's plans for reviewing test and maintenance procedures and Technical Specifications to assure that post-maintenance operability testing of all safety-related equipment is required to be conducted. However, this item cannot be completely evaluated until CP&L's final response is submitted to the NRC with the results of its reviews. In order for us to complete the evaluation, CP&L needs to complete its review of test and maintenance procedures and Technical Specifications by the committed date of August 1985 and submit the results to NRC in a supplemental response.

- D. Item 3.2.2 - Check of Vendor and Engineering Recommendations for Testing and Maintenance (All Other Safety-Related Components)

CP&L states in its response that an assessment of safety-related vendor and engineering recommendations is planned and will be completed by December 1985. CP&L stated that it will submit the results of its review in a supplemental response. We concur with the licensee's plans and schedules for completing its review of vendor and engineering recommendations for testing and maintenance; however, this item cannot be completely evaluated until we receive the results of its assessment. The licensee is requested to complete its assessment of vendor and engineering recommendations for testing and maintenance by the committed date of December 1985 and submit the results of its assessments to the NRC in a supplemental response.