



Carolina Power & Light Company

Brunswick Nuclear Plant  
P.O. Box 10429  
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10 CFR 2.201

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2  
DOCKET NOS. 50-325 AND 50-324/LICENSE NOS. DPR-71 AND DPR-62  
REPLY TO A NOTICE OF VIOLATION

Gentlemen:

On January 14, 1994, the Nuclear Regulatory Commission (NRC) issued a Notice of Violation for the Brunswick Steam Electric Plant, Units 1 and 2. The basis for the violation is provided in NRC Inspection Report 50-325/93-58 and 50-324/93-58. Carolina Power & Light Company finds the inspection report does not contain information of a proprietary nature. Enclosure 1 provides Carolina Power & Light Company's response to the Notice of Violation in accordance with the provisions of 10 CFR 2.201.

As discussed with NRC Region II staff, the response due date was extended to February 21, 1994. Please refer any questions regarding this submittal to Mr. T. Harris at (910) 457-3312.

Very truly yours,

C. C. Warren  
Director-Plant Operations (Acting)  
Brunswick Nuclear Plant

KAH/

Enclosures

1. Reply to Notice of Violation
2. List of Commitments

cc: Mr. S. D. Ebnetter, Regional Administrator, Region II  
Mr. P. D. Milano, NRR Senior Project Manager - Brunswick Units 1 and 2  
Mr. R. L. Prevatte, Brunswick NRC Senior Resident Inspector

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ENCLOSURE 1

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 and 2  
NRC DOCKET NOS. 50-325 & 50-324  
OPERATING LICENSE NOS. DPR-71 & DPR-62

REPLY TO NOTICE OF VIOLATION

VIOLATION A:

10 CFR Part 50, Appendix B, Criterion V requires, in part, that "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

Paragraph 2.0 of the General Electric tensioner qualification procedure B1-SR/SCI-QUAL-002, Revision 0, states, "Tensioners are to be tested to determine the resultant preload on the joint bolt. Testing will be on a fixture against a calibrated load cell to determine preload as a function of hydraulic pressure on the tensioner." In addition, paragraph 3.0 states, "Equipment to be qualified will be of the same configuration to be used at the site and as described in this procedure." Paragraph 12.2.1 within Section 12.0 of the General Electric Quality Assurance Manual states, "suitable measuring and test equipment with the proper range and accuracy shall be used to assure compliance with ...project specifications." Paragraph 12.2.2 of the same section specifies, in part, "Records shall be maintained and equipment marked to reflect current calibration status."

Contrary to the above, while preparing for installation of core shroud clamps on November 13, 1993, tests were completed utilizing a bench test setup which was not representative of the configuration used at the site. Curvature of shroud surfaces and reduced area sections were not accounted for in the test setup. In addition, data was taken utilizing a load cell which was loaded beyond the calibration limits for the gage. On December 11, 1993, General Electric test procedure B1-SR/VT-001, Revision 0, was found to be inadequate in that the procedure did not specify instructions for connecting the load cell with the microprocessor, did not specify instructions for reading and interpreting the indicated load, and failed to require calibration of the microprocessor used to sense the load cell output and display the applied load. In addition, on December 18, 1993, a post installation bolt tension test was conducted on a mock-up of the shroud and the bracket at the Brunswick facility. The tension test used the hydraulic pressures established in the November 13, 1993, bolt tension qualification test which were subsequently used to tension the bolting for the twelve installed shroud brackets in Unit 1. The hydraulic pressure established for tensioning the lower shroud bolts resulted in a bolt preload greater than that delineated in the General Electric design criteria.

This is a Severity Level IV Violation (Supplement 1).

RESPONSE TO VIOLATION A:

Admission or Denial of Violation

Carolina Power & Light admits this violation.

Reason for Violation

This violation consists of four specific examples. With respect to the overall scope of the violation, insufficient oversight of the vendor implementation program was the primary causal factor.

A "Reason for Violation" for each of the specific examples follows.

- 1) The purpose of the bench test was to establish a correlation between the bolt tensioner hydraulic pressure and the post-tensioned remaining bolt preload. In order to measure the remaining bolt preload, a load cell was included in the bench test mockup. This load cell was not intended to be used in the actual plant installations. For the data to correlate to the plant installation, the length of the bolt remaining in tension in the bench test had to match the length of bolt remaining in tension in the installed configuration. The shroud/clamp thickness was simulated by using machined plates in conjunction with the load cell to make up the required thickness. Therefore, this difference between the bench test mockup and the site configuration was due to the need to include test instrumentation. GE had evaluated the effects of the curvature of the shroud surface. With the large diameter of the shroud and relatively small area of the bolt heads, no significant impact on remaining bolt preload was expected.
- 2) GE ordered a calibrated load cell for use during the bolt tensioning qualification. The load cell was used during the bench testing. GE contacted the load cell vendor and was provided with verbal concurrence that the load cell could be loaded above its rated capacity. GE used the load cell for loads above the rated capacity without formally recalibrating the device. GE Quality Control personnel failed to recognize the need to recalibrate the load cell prior to allowing it to be used at loads above its rated capacity. When GE realized that they had used the load cell in an application above its rated calibration range, GE recalibrated the load cell to the higher load range and found it accurate.
- 3) GE typically performs qualification of tooling and processes at its own testing facilities using qualified personnel familiar with test equipment setup. When the tensioner qualification was performed in San Jose, no procedure setup problems were encountered. GE failed to review the qualification procedure to ensure that the procedure could be used at BNP using field personnel. The microprocessor was used to convert a millivolt signal from the calibrated load cell into pounds and display the result. GE considered the microprocessor as a signal "display" device in lieu of a "measuring" device. GE did not feel that microprocessor calibration was required.
- 4) GE performed the tensioning qualification using a calibrated load cell. The load cell was positioned directly against the bolt head in the bench-test stackup and subsequently loaded using the tensioner. In this configuration, the load cell was asymmetrically or non-uniformly loaded. GE did not understand the effects of asymmetrical loading on the load cell and believed that using the load cell in this configuration was

acceptable. Subsequent testing has shown that the load cell is highly sensitive to non-uniform loading. GE confirmed this with the load cell vendor. Subsequent site testing further confirmed the sensitivity to non-uniform loading.

#### Corrective Actions Which Have Been Taken and Results Achieved

The individual examples of this violation have been corrected as follows:

- 1) GE developed Procedure B1-SR/VT-002, "Brunswick Unit 1 Shroud Repair Project Tensioner Load Test Verification Instruction." This procedure was subsequently used to verify the qualification of the bolt tensioning and determine remaining bolt preload using the actual clamp configuration on a curved shroud mockup.
- 2) The load cell was removed from service and recalibrated for the higher load range. Calibration of the load cell for the higher range confirmed the vendor information that the load cell was acceptable for use at higher ranges. Also, a higher range load cell was procured by GE for verification testing of the tensioning process.
- 3) A calibrated voltmeter was used instead of the microprocessor at the site. The calibrated voltmeter was used to measure the load cell output signal. The signal was converted to pounds-force using the load cell vendor's calibration equation.
- 4) GE generated a nonconformance report (NCR) with respect to this issue. GE Engineering evaluated the NCR and determined that the remaining bolt preload was acceptable. Design documents were revised to reflect this information.

#### Corrective Steps Which Will Be Taken to Avoid Further Violations

The individual examples of this violation have been identified as "lessons-learned" in the planning and development of the Unit 2 shroud modification to ensure that similar concerns are not encountered during the Unit 2 work. As a result, the following actions are being implemented for the Unit 2 shroud activities:

- Additional engineering and NAD oversight for the vendor's tool qualification testing is being provided.
- Formal project and quality implementation plans are being developed.

Additional corrective actions with respect to the more generic concerns of vendor oversight are addressed in the response to Violation B of NRC Inspection Report 93-58.

#### Date When Full Compliance Will Be Achieved

Carolina Power & Light is in full compliance with 10 CFR 50, Appendix B, with respect to this issue.

VIOLATION B:

10 CFR Part 50, Appendix B, Criterion V requires that "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

Paragraph 8.4.5 within Section 8.0 of the General Electric Quality Assurance Manual states that "The status of material or items shall be maintained by a tagging system in accordance with Section 14.0 of the manual." Paragraph 14.4.1 requires the application of a "QC Accept" sticker or tag on accepted materials after satisfactory receipt inspection. Paragraph 10.5.1 within Section 10.0 of the General Electric Quality Assurance Manual requires in-process inspection to be "...performed and documented on the traveler, work package and/or subtier documents...as appropriate to the inspection being performed." Paragraph 10.5.2 states, in part, "No work shall progress beyond an established hold point until inspected by the person organizationally responsible or having the authority for establishing the hold point." Also, a measurement Tool Check List which was part of bracket installation traveler stated in part, "Complete the following checks prior to installation [of the tool] in the reactor vessel."

Contrary to the above, on December 7 and 8, 1993, the inspector identified the following quality assurance and quality control violations:

- (1) A lubricant used in the installation procedure for the shroud repair was not tagged with a "QC Accept" sticker.
- (2) Measurement tool check lists within travelers for BRACK-15 and BRACK-135 were not signed as required although the work had been completed two days prior to this finding.
- (3) Measurements for shim gap taken as required in Sequence 4A of the traveler for MSHIM-315 were recorded on the incorrect data sheet (MSHIM-225, SPCS-01, Steps 1 and 2) and were subsequently verified by quality control.
- (4) The hold point associated with Sequence 2B of the traveler MSHIM-15 was not signed although subsequent steps had been completed and signed off.
- (5) A QC check of step 4A in the traveler BRACK-105 was not verified and signed prior to completion of subsequent procedural steps.

This is a Severity Level IV Violation (Supplement 1).

## RESPONSE TO VIOLATION B:

### Admission or Denial of Violation

Carolina Power & Light Company admits that insufficient oversight of the vendor occurred during the installation of the repair on the core shroud.

### Reason for Violation

CP&L's Nuclear Assessment Department's (NAD) Brunswick Plant Assessment Section (BPAS) performed an assessment of General Electric Company's Quality Assurance program as a result of this issue. The conclusions of this assessment indicated that the principal cause of this violation was the absence of adequate assessment and oversight of vendors, suppliers, and contractor's implementing procedures. Although vendors are formally audited to ensure the acceptability of their 10 CFR 50 Appendix B program prior to performing services for the Brunswick Plant, no guidance exists on verifying the adequacy of the actual implementation of the vendor's 10 CFR 50 Appendix B program for services/products performed for BNP. The inadequate assessment and oversight of vendor/supplier/contractor quality program implementation, therefore, was the result of not having clearly defined responsibilities for this activity.

### Corrective Actions Which Have Been Taken and Results Achieved

As a result of shroud project concerns identified on December 7 and 8, 1993, work on the shroud project was stopped. Workers were briefed on the importance of maintaining current and accurate documents and records. These briefings were attended by CP&L project management personnel. In addition, continuous oversight of the GE efforts on the Unit 1 refueling floor was initiated by the BPAS. This oversight continued through the end of the shroud repair effort and subsequent reload of the Unit 1 core.

The individual examples of this violation have been resolved. General Electric Company initiated a Corrective Action Request (CAR) to identify causes and actions to prevent recurrence under the GE Appendix B program for the issues identified. Carolina Power & Light Company also conducted a quality assurance audit of GE site activities at the Brunswick Plant December 16-17 and 20, 1993. The audit was conducted to evaluate the GE QA Program for effective implementation and compliance with ANSI N45.2 and 10 CFR 50, Appendix B as it pertains to site services. By letter dated January 6, 1994, the results of this audit were provided to General Electric Company. General Electric responded to the audit findings by letter dated January 31, 1994. Also included in the January 31, 1994 GE letter was the completed GE CAR for this issue. Carolina Power & Light Company is currently reviewing the GE response.

### Corrective Steps Which Will Be Taken to Avoid Further Violations

To preclude further violations in this area, the following responsibilities have been defined for vendor, contractor, and supplier oversight at the Brunswick Plant:

1. NAD's BPAS is responsible for performing initial assessments, as appropriate, of vendor, supplier, and contractor implementation of their 10 CFR 50 Appendix B program (including procedures being used for implementation) for services/products being provided at BNP to ensure that BNP expectations for quality products are being met, as established by contractual terms.



Technical review of contractor and vendor procedures is the responsibility of the line organization responsible for the work. The NAD BPAS is responsible for reviewing contractor and vendor procedures to ensure that the procedures comply with the vendor's 10 CFR 50 Appendix B program.

2. Following the initial assessment, line supervision will be responsible for providing ongoing assessment of vendor, supplier, and contractor work to ensure continued compliance with the outside organization's procedures used at the Brunswick Plant.
3. Through surveillance/observations of on-going work, BPAS is responsible for ensuring that contractor and line management are effectively carrying out their defined responsibilities.

Date When Full Compliance Will Be Achieved

Carolina Power & Light is in compliance with 10 CFR 50, Appendix B as it relates to this issue. Additional actions are being taken to further ensure adequate vendor oversight in the future.

Enclosure 2  
List of Regulatory Commitments

The following table identifies those actions committed to by Carolina Power & Light Company in this document. Any other actions discussed in the submittal represent intended or planned actions by Carolina Power & Light Company. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Manager-Regulatory Affairs at the Brunswick Nuclear Plant of any questions regarding this document or any associated regulatory commitments.

Commitment	Committed date or outage
1. Develop and implement method for performing initial assessments, as appropriate, of vendors, suppliers, and contractor's implementation of their 10 CFR 50 Appendix B program for services/products being provided at BNP to ensure that expectations for quality products are being met as established by contractual terms.	NA
2. Management expectations on vendor, supplier, and contractor work oversight responsibilities will be communicated to appropriate site personnel.	NA
3. Develop formal project and quality implementation plans for the Unit 2 shroud project.	NA