



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

November 6, 2008

Mr. Benjamin Waldrep, Vice President  
Brunswick Steam Electric Plant  
Carolina Power & Light Company  
Post Office Box 10429  
Southport, North Carolina 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 – RELIEF REQUEST  
PT-01 FOR THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL ON  
SYSTEM PRESSURE TEST BOUNDARY (TAC NOS. MD8118 AND MD8119)

Dear Mr. Waldrep:

By letter dated February 6, 2008, Carolina Power & Light Company (the licensee) submitted Relief Request PT-01 (RR-PT-01) related to the fourth 10-year interval of the Brunswick Steam Electric Plant (BSEP), Units 1 and 2 Inservice Inspection (ISI) Program. In RR PT-01, the licensee proposed to perform system leakage test conducted at or near the end of inspection interval of American Society of Mechanical Engineers (ASME) Code, Class 1 pressure retaining components in reactor coolant pressure boundary vent, drain, test and fill lines ( $\leq 1$  inch) with both isolation valves closed that would exclude a small segment of Class 1 line from the test boundary. The fourth 10-year ISI interval began on May 11, 2008, and is scheduled to be completed by May 10, 2018.

The Nuclear Regulatory Commission (NRC) staff has evaluated RR PT-01 and concluded that the licensee's compliance to the ISI code of record (the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI) would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, and that the proposed alternative provides reasonable assurance of structural integrity. Therefore, pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(ii), the NRC authorizes the ISI program alternative proposed in RR PT-01 for the fourth 10-year ISI interval of BSEP, Units 1 and 2.

The bases for the NRC staff's conclusion are contained in the enclosed Safety Evaluation. If you have any questions regarding this issue, please contact Farideh Saba at (301) 415-1447 or [farideh.saba@nrc.gov](mailto:farideh.saba@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "T. H. Boyce".

Thomas H. Boyce, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-325 and 50-324

Enclosure: Safety Evaluation

cc w/encl: See next page

Carolina Power & Light Company

**Brunswick Steam Electric Plant,  
Units 1 and 2**

cc:

Sandra Spencer, Mayor  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST PT-01 FOR THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

DOCKET NOS. 50-325 AND 50-324

1.0 INTRODUCTION

By letter dated February 6, 2008, Carolina Power & Light Company (the licensee) submitted Relief Request PT-01 (RR PT-01), related to the fourth 10-year interval of the Brunswick Steam Electric Plant (BSEP), Units 1 and 2 Inservice Inspection (ISI) Program. In RR PT-01, the licensee proposed to perform system leakage test conducted at or near the end of inspection interval of American Society of Mechanical Engineers (ASME) Code, Class 1 pressure retaining components in reactor coolant pressure boundary (RCPB) vent, drain, test and fill (VDTF) lines ( $\leq 1$  inch) with both isolation valves closed that would exclude a small segment of ASME Class 1 line from the test boundary.

The licensee's request for relief is based on hardship of making multiple entries into the containment for valve alignment and thus, exposing personnel to high radiation and the risk of failure due to single valve isolation. The fourth 10-year ISI interval began on May 11, 2008 and is scheduled to be completed by May 10, 2018.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g) requires that ISI of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the NRC, if: (i) an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety, or (ii) the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b), 12 months prior to the start of the 120-month interval, subject to the limitations and modifications

Enclosure

listed therein. The ISI code of record for the fourth 10-year inspection interval for BSEP, Units 1 and 2 is the 2001 Edition through the 2003 Addenda of the ASME Code, Section XI.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Relief Request PT-01

Relief is requested from performing the system leakage test of the pressure retaining components per IWB-5222(b), for portions of the ASME Code Class 1 RCPB VDTF lines and connections with the inboard isolation valves closed, which would exclude a small segment of ASME Class 1 line between each inboard and outboard isolation valve from the test boundary.

##### 3.1.1 Components for Which Relief is Requested

RCPB VDTF lines ( $\leq 1$  inch).

##### 3.1.2 Code Requirements

The 2001 Edition through the 2003 Addenda of ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P, Item Number B15.10, requires all ASME Class 1 pressure retaining components be subject to a system leakage test with a VT-2 visual examination in accordance with IWB-5220. This pressure test is to be conducted prior to plant startup following each reactor refueling outage. The pressure retaining boundary for the test conducted at or near the end of each inspection interval shall be extended to all ASME Class 1 pressure retaining components per IWB-5222(b).

##### 3.1.3 Licensee's Proposed Alternative

The RCPB VDTF lines and connections 1-inch nominal pipe size and smaller will be visually examined for leakage with the inboard isolation valves in the normally closed position during the system leakage test conducted at or near the end of each inspection interval.

##### 3.1.4 Licensee's Basis for Requesting Relief

The VDTF lines and connections 1-inch nominal pipe size (NPS) and smaller off the RCPB are equipped with manual valves that provide double valve isolation of the RCPB. During normal operation, these manual isolation valves are maintained in the closed or locked-closed position. Thus components downstream of the first isolation valve are not subjected to reactor coolant system (RCS) pressure unless leakage through the inboard valves occurs.

The licensee, in the letter dated February 6, 2008, stated that the ASME Code requirements would require system pressurization to extend to all Class 1 pressure retaining components within the system boundary. To comply with this requirement, the first isolation valve would be required to be open during the pressure test. The licensee stated that having the first isolation valve open during the test would defeat the design requirement for double isolation of the RCPB. As such, this non-standard configuration would increase the risk for inventory loss. Because of the potential for inventory loss, this configuration also creates safety concerns for the personnel performing the visual examination.

The licensee added that the 1-inch NPS and smaller VDTF connections are normally closed during plant operation. The outboard valves would only see pressure if the inboard valve is open or leaks by the seat. Seat leakage, although undesirable, is not indicative of a flaw in the pressure boundary. Furthermore, these valves are in close proximity to the main runs of pipe. The non-isolable portion of these VDTF connections is pressurized and VT-2 examined during the test. However, the VT-2 examination performed during each refueling outage extends to the outboard valve, even though it is not pressurized.

In addition, the licensee stated that opening the first manual valve will create a hardship in regards to personnel exposure and contamination. These valves are typically located in the close proximity of the main RCPB piping. Opening these valves will require personnel to enter radiation fields to position the valves for the test, restore the valves following the pressure test, and to perform the required independent valve position verification. The licensee estimated that performing the required ASME Code pressure tests exposes plant personnel to 1 roentgen equivalent man (rem) per unit (per each test) and increases the risk for personnel contamination.

The licensee, in RR PT-01 under "Proposed Alternative and Basis for Use," stated that "extending the system pressure to the components downstream of the first normally closed isolation valve is a hardship and poses safety concerns for the plant and personnel. The components affected by this relief request were designed and constructed to the highest standards available. The test configuration of these components is the same as they experience during normal operations and [ASME] Code required system leakage test. In addition, extending the test pressure to these components once per ten years is unjustifiable considering these same components would be exempt from pressure testing if repaired or replaced. For these reasons, approving the use of the proposed alternative will provide an acceptable level of safety and quality."

### 3.1.5 NRC Staff Evaluation of Relief Request PT-01

The ASME Code, Section XI requires that all Class 1 components within the reactor coolant system (RCS) boundary undergo a system leakage test at the end of each refueling outage and a system leakage test at or near the end of each inspection interval. In RR PT-01, the licensee proposed an alternative to the requirement of the test for the RCPB VDTF lines that would cause some line segments to be excluded from the test boundary. The line segments include two manually operated valves separated by a short pipe that is connected to the RCS. The line configuration, as outlined, provides double-isolation of the RCS. Under normal plant operating conditions, the subject line segments would see RCS temperature and pressure only if leakage through the inboard valves occurs. For the licensee to perform the system leakage test at or near the end of inspection interval in accordance with the ASME Code, it would be necessary to manually open the inboard valves to pressurize the line segments. Therefore, pressurization by this method would preclude the RCS double valve isolation, and may cause concerns for the personnel performing the examination that would result in a hardship.

In addition, typical line/valve configurations are in close proximity of the RCPB main runs of pipe and thus, would require personnel entry into high radiation areas within the drywell. Manual actuation (opening and closing) of these valves before and after the test will take considerable time and is estimated to expose plant personnel to 1 rem per test. The licensee, therefore, has

require multiple entries into drywell for manual actuation of the isolation valves. This alternative is the same requirement that is used during the ASME Code-required system leakage test performed during every refueling outage. Only the isolable portion will not be pressurized during test. Since these lines are in the same configuration during normal operation, use of this alternative poses no new safety concern. The licensee, however, would perform a VT-2 visually examination of the segments of piping between the inboard and outboard isolation valves in their normally closed position for any evidence of leakage during the inspection interval. The VT-2 visual examination of these piping segments with no evidence of any leak, will assure the structural integrity of the 1 inch and smaller VDTF piping. The NRC staff notes that this approach is consistent the applicable ASME Code that exempts any pressure test on repairs to components and piping 1 inch NPS and smaller.

Based on the above discussion, the NRC staff determines that the licensee's proposed alternative will provide reasonable assurance of structural integrity for the RCPB VDTF line segments while maintaining personnel radiation exposure to as low as reasonably achievable. The NRC staff has further concluded that compliance to the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

#### 4.0 CONCLUSION

Based on the evaluation of the request for relief, the NRC staff has concluded that the licensee's proposed alternative would provide reasonable assurance of structural integrity, and compliance with the ASME Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in RR PT-01 is authorized for the fourth 10-year ISI interval at BSEP, Units 1 and 2. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third party review by the authorized Nuclear Inservice Inspector.

Principal Contributors: Prakash Patnaik

Date: November 6, 2008

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Sincerely,  
**/RA/**  
Thomas H. Boyce, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-325 and 50-324

Enclosure: Safety Evaluation

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