

November 21, 2002

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2 - ISSUANCE OF  
AMENDMENT REGARDING CONTAINMENT LEAKAGE RATE TESTING  
PROGRAM (TAC NO. MB3471)

Dear Mr. Keenan:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 250 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant (BSEP), Unit 2. The amendment changes the Technical Specifications in response to your submittal dated November 26, 2001, as supplemented January 31, February 5, February 11, and October 8, 2002.

The amendment provides for an alternate method for complying with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(o), and 10 CFR Part 50, Appendix J, Option B for BSEP, Unit 2. Specifically, the amendment allows a one-time interval increase for the BSEP, Unit 2 Type A, Integrated Leakage Rate Test for no more than 2 years, 2 months. The balance of your November 26, 2001, request for BSEP, Unit 1, was addressed in Amendment No. 216 issued on March 6, 2002.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's bi-weekly Federal Register Notice.

Sincerely,

**/RA/**

Brenda L. Mozafari, Senior Project Manager, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-324

Enclosures:

1. Amendment No. 250 to License No. DPR-62
2. Safety Evaluation

cc w/encls: See next page

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Dear Mr. Keenan:

The Nuclear Regulatory Commission has issued the enclosed Amendment No.250 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant (BSEP), Unit 2. The amendment changes the Technical Specifications (TS) in response to your submittal dated November 26, 2001, as supplemented January 31, February 5, February 11, and October 8, 2002.

The amendment provides for an alternate method for complying with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(o), and 10 CFR Part 50, Appendix J, Option B for BSEP, Unit 2. Specifically, the amendment allows a one-time interval increase for the BSEP, Unit 2 Type A, Integrated Leakage Rate Test for no more than 2 years, 2 months. The balance of your November 26, 2001, request for BSEP, Unit 1, was addressed in Amendment No. 216 issued on March 6, 2002.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's bi-weekly Federal Register Notice.

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**/RA/**

Brenda L. Mozafari, Senior Project Manager, Section 2  
Project Directorate II  
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- 2. Safety Evaluation

Package No. **ML023300399**

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CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No.250  
License No. DPR-62

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by Carolina Power & Light Company (the licensee), dated November 26, 2001, as supplemented January 31, February 5, February 11, and October 8, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications, as indicated in the attachment to this license amendment; and paragraph 2.C.(2) of Facility Operating License No. DPR-62 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 250, are hereby incorporated in the license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Allen G. Howe, Chief, Section 2  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: November 21, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 250

FACILITY OPERATING LICENSE NO. DPR-62

DOCKET NO. 50-324

Replace the following pages of the Appendix "A" Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

<u>Remove Pages</u>	<u>Insert Pages</u>
5.0-16	5.0-16
5.0-17	5.0-17
5.0-18	5.0-18
5.0-19	5.0-19
5.0-20	5.0-20
5.0-21	5.0-21
5.0-22	5.0-22
5.0-23	5.0-23
5.0-24	5.0-24
---	5.0-25

EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 250 TO FACILITY OPERATING LICENSE NO. DPR-62  
CAROLINA POWER & LIGHT COMPANY  
BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2  
DOCKET NO. 50-324

## 1.0 INTRODUCTION

By letter dated November 26, 2001, as supplemented January 31, February 5, February 11, and October 8, 2002, the Carolina Power & Light Company (CP&L, the licensee) submitted a request for changes to the Brunswick Steam Electric Plant (BSEP), Unit 2, Technical Specifications (TS). The requested change would provide for an alternate method for complying with the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.54(o), and 10 CFR Part 50, Appendix J, Option B. Specifically, the amendment allows a one-time interval increase for the BSEP, Unit 2, Type A Integrated Leakage Rate Test (ILRT) of up to 5 years. The January 31 and February 5, 2002, letters provided clarifying information only and did not change the initial proposed no significant hazards consideration determination, or expand the scope of the initial *Federal Register* notice. The February 11, 2002, letter changed the requested Type A test interval extension for BSEP, Unit 1, from 5 years, 1 month to no more than 3 years, 2 months. On March 6, 2002, Amendment No. 216 to the Unit 1 Operating License and TS was issued to allow the extension of 3 years, 2 months for Unit 1. The October 8, 2002, letter changed the requested Type A test interval extension for BSEP, Unit 2, from 5 years to no more than 2 years, 2 months. The reduction in the requested extension is bounded by the initial proposed no significant hazards consideration determination and did not expand the scope of the initial *Federal Register* notice.

This Safety Evaluation (SE) only evaluates the request for a one-time interval increase for the BSEP, Unit 2, Type A ILRT for no more than 2 years, 2 months. The balance of the licensee's November 26, 2001, request for BSEP, Units 1 and 2, was previously addressed in the SE dated March 6, 2002, in support of Amendment No. 216 for Unit 1.

## 2.0 BACKGROUND

Appendix J, Option B of 10 CFR Part 50 requires a Type A test to be conducted at a periodic interval based on the historical performance of the overall containment system. BSEP, Unit 2, TS 5.5.12 requires the ILRT to be performed at a frequency in accordance with 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guidelines contained in Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by approved exceptions. This RG endorses, with certain exceptions, Nuclear Energy Institute (NEI) 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 26, 1995.

A Type A test is an overall ILRT of the containment structure. NEI 94-01 specifies an initial test interval of 48 months, but allows an extended interval of 10 years based upon two consecutive successful tests. There is also a provision for extending the test interval an additional 15 months beyond the 10-year interval in certain circumstances. The two most recent Type A tests at BSEP, Unit 2, have been successful, so the current Type A leakage rate test interval is 10 years.

The licensee requested a change to TS 5.5.12, "Primary Containment Leakage Rate Testing Program," which would allow an exception from the Type A test interval guidelines in RG 1.163. Specifically, the proposed addition to TS 5.5.12, which would allow an exception to the Type A testing frequency specified in NEI 94-01, paragraph 9.2.3, reads as follows:

- f. NEI 94-01 - 1995, Section 9.2.3: The first Type A test performed after the February 28, 1993, Type A test shall be performed no later than April 30, 2005.

Thus, the proposed TS changes would allow BSEP, Unit 2, a one-time extension of the current 10-year Type A test interval to a 12-year, 2-month interval from the last successful test performed on February 28, 1993.

### 3.0 EVALUATION

#### 3.1 Probabilistic Risk Assessment Evaluation

The licensee has stated that the BSEP internal events probabilistic safety assessment (PSA) model and documentation have been maintained "living" and are routinely updated to reflect the current plant configuration following refueling outages and to reflect the accumulation of additional plant operating history and component failure data. A full upgrade of the BSEP Level I internal events PSA models began in 1998 and was completed in 2000. The BSEP Level II analysis was fully upgraded in 2001. In the November 26, 2001, application, the licensee stated that its plant-specific risk assessment uses the latest peer-reviewed BSEP Level 1 and Level 2 PSA models to estimate the changes in risk associated with increasing the Type A testing interval.

The licensee initially performed a risk impact assessment of extending the Type A test interval to 15 years. Although the licensee reduced the requested test interval to 12 years, 2 months, this evaluation is based on the original 15-year requested test interval. In performing the risk assessment, CP&L considered the guidelines of NEI 94-01, the methodology used in Electric Power Research Institute (EPRI) TR-104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing," and RG 1.174, "An Approach For Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis."

The basis for the current 10-year test interval is provided in Section 11.0 of NEI 94-01, Revision 0, and was established in 1995 during development of the performance-based Option B to Appendix J. Section 11.0 of NEI 94-01 states that NUREG-1493, "Performance-Based Containment Leak-Test Program," September 1995, provided the technical basis to support rulemaking to revise the leakage rate testing requirements contained in Option B to Appendix J. The basis consisted of qualitative and quantitative assessments of the risk impact (in terms of increased public dose) associated with a range of extended leakage rate test intervals. To supplement the U.S. Nuclear Regulatory Commission's (NRCs) rulemaking basis, NEI undertook a similar study. The results of that study are documented in Electric Power Research Institute (EPRI) TR-104285.

The EPRI study used an analytical approach similar to that presented in NUREG-1493 for evaluating the incremental risk associated with increasing the interval for Type A tests. The EPRI study estimated that relaxing the test frequency from 3 in 10 years to 1 in 10 years will increase the average time from 18 to 60 months that a leak detectable only by a Type A test goes undetected. Since Type A tests only detect about 3 percent of leaks (the rest are identified during local leak rate tests based on industry leakage rate data gathered from 1987 to 1993), this results in a 10-percent increase in the overall probability of leakage. The risk contribution of pre-existing leakage, in percent of person-rem/year, for the Pressurized Water Reactor and Boiling Water Reactor representative plants confirmed the NUREG-1493 conclusion that a reduction in the frequency of Type A tests from 3 per 10 years to 1 per 10 years leads to an “imperceptible” increase in risk ranging from 0.02 to 0.14 percent.

Building upon the methodology of the EPRI study, the licensee assessed the change in the predicted person-rem/year frequency. The licensee quantified the risk from sequences that have the potential to result in large releases if a pre-existing leak were present. Since the Option B rulemaking in 1995, the staff has issued RG 1.174 on the use of probabilistic risk assessment (PRA) in risk-informed changes to a plant’s licensing basis. The licensee has proposed using RG 1.174 to assess the acceptability of extending the Type A test interval beyond that established during the Option B rulemaking. RG 1.174 defines very small changes in the risk-acceptance guidelines as increases in core damage frequency (CDF) less than  $10^{-6}$  per reactor year and increases in large early release frequency (LERF) less than  $10^{-7}$  per reactor year. Since the Type A test does not impact CDF, the relevant criterion is the change in LERF. The licensee has estimated the change in LERF for the proposed change and the cumulative change from the original 3 in 10 year interval. RG 1.174 also discusses defense-in-depth and encourages the use of risk analysis techniques to help ensure and show that key principles, such as the defense-in-depth philosophy, are met. The licensee estimated the change in the conditional containment failure probability for the proposed change to demonstrate that the defense-in-depth philosophy is met.

The licensee provided an analysis that estimated all of these risk metrics using a methodology that is consistent with previously approved submittals. The following conclusions can be drawn from the analysis associated with extending the Type A test frequency:

- a. A slight increase in risk is predicted when compared to that estimated from current requirements. Given the change from a 10-year test interval to a 15-year test interval, the increase in the total integrated plant risk in person-rem/year is estimated to be 0.001 percent. The increase in the total integrated plant risk, given the change from a 3 in 10-year test interval to a 15-year test interval, was 0.002 percent. NUREG-1493 concluded that a reduction in the frequency of tests from 3 per 10 years to 1 per 10 years leads to an “imperceptible” increase in risk ranging from 0.02 to 0.14 percent. Therefore, the increase in the total integrated plant risk for the proposed change is considered small and supportive of the proposed change.
- b. The increase in LERF resulting from a change in the Type A test interval from the original 3 in 10 years to 1 in 15 years is estimated to be  $1.5 \times 10^{-7}$ /year using a methodology based on the EPRI study.

However, there is some likelihood that the undetected flaw in the containment liner estimated as part of the class 3B frequency would be detected as part of the IWE visual examination process of the containment liner. The containment was visually inspected in 2000 and 2002.

An additional visual inspection is now planned for 2004. Fifty percent of the inner containment liner can be visually inspected. If the visual inspections are effective in detecting large flaws in the visible regions of the containment, then the increase in LERF would decrease from  $1.5 \times 10^{-7}$ /year to  $7.5 \times 10^{-8}$ /year. Therefore, increasing the Type A interval to 15 years is considered to be a very small change in LERF when using the guidelines of RG 1.174.

The licensee performed an additional risk analysis to consider the impact of hypothetical corrosion in inaccessible areas of the containment liner on the proposed change. The inaccessible areas included the backside of the containment liner. The risk analysis considered the likelihood of an age-adjusted liner flaw that would lead to a breach of containment. The risk analysis also considered the likelihood that the flaw was not visually detected but could be detected by a Type A ILRT. When possible corrosion of the containment liner is considered, the increase in LERF resulting from a change in the Type A test interval from the original 3 in 10 years to 1 in 15 years is estimated to be  $9.2 \times 10^{-8}$ /year. This additional risk analysis provides added assurance that increasing the Type A interval to 15 years is a very small change in LERF.

The 50-percent assumption is conservative based on the amount of the containment liner that is visually inspected as part of the IWE examination process. The examinations required by Subsection IWE will be completed during the Second Inspection Period, which takes place between May 11, 2001, and May 10, 2005. A general visual examination will be performed on the accessible surface areas of primary containment that are not submerged or insulated. The examinations of the drywell include over 90 percent of the drywell's leakage boundary. For the suppression chamber, the accessible surface area above the water line represents greater than 50 percent of the entire leakage boundary. For the vent system, only the lower portion of the downcomers is submerged. In addition, three defects of the drywell liner were identified by IWE visual examinations during the Spring 1999 outage. The applicable requirements of Subsection IWE were being implemented for the first time during this outage. The defects were not identified by previous Type A ILRT leakage results.

- c. RG 1.174 also encourages the use of risk analysis techniques to help ensure and show that the proposed change is consistent with the defense-in-depth philosophy. Consistency with the defense-in-depth philosophy is maintained if a reasonable balance is preserved among prevention of core damage, prevention of containment failure, and consequence mitigation. This proposal does not impact prevention of core damage. The impact of this proposal on prevention of containment failure and consequence mitigation was investigated using the conditional containment failure probability. The change in the conditional containment failure probability was estimated to increase by 0.1 percent for the proposed change and 0.3 percent for the cumulative change of going from a test interval of 3 in 10 years to 1 in 15 years. The NRC staff finds that the defense-in-depth philosophy is maintained based on the change in the conditional containment failure probability for the proposed amendment.

Based on these conclusions, the NRC staff finds that the increase in predicted risk due to the proposed change is within the acceptance guidelines while maintaining the defense-in-depth philosophy of RG 1.174 and, therefore, is acceptable.

### 3.2 Mechanical and Structural Integrity Evaluation

The licensee initially requested an extension of the Appendix J, Type A, ILRT test interval of 5 years for BSEP, Unit 2, of 5 years in its November 26, 2001, submittal. The licensee revised the interval extension request for BSEP, Unit 2, for up to 2 years, 2 months in its October 8, 2002, supplement. The NRC staff has reviewed this request and finds the interval extension for up to 2 years, 2 months acceptable. The basis for acceptability is as follows:

- A. Appendix J, Option B of 10 CFR Part 50 requires, for performance-based leakage testing, that a Type A test be conducted at a periodic interval based on the historical performance of the overall containment system as a barrier to fission products. Specific guidance concerning a performance-based leakage program including test intervals are provided in RG 1.163. RG 1.163 endorses NEI Guideline 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," that recommends a maximum of 10 years for a Type A test interval based on performance data. Requests to extend Type A test intervals for more than 10 years have been approved by the NRC using a risk-informed approach. As part of the risk-informed approach, the NRC staff has been reviewing the licensee's efforts that provide assurance that the integrity of the containment structure is maintained during its service life. This review includes an evaluation of the licensee's program for containment inservice inspection.
- B. The licensee stated that the containment inservice inspection (ISI) program at BSEP, Unit 2, was developed in accordance with Subsection IWE and IWL of American Society of Mechanical Engineers (ASME), Section XI, 1992 Edition with the 1992 Addenda. Visual inspections under this program were performed on the accessible area of BSEP Unit 2 containment.

During the spring 1999 outage (B214R1), the visual inspections identified three defects on the dry well liner plate, and they were approximately located at elevations 18, 56, and 70 ft. According to the licensee's submittal dated February 5, 2002, these three defects were repaired in accordance with ASME Code, Section XI, 1992 edition with 1992 Addenda. The repaired areas were examined in accordance with the applicable Construction Code and Design Specification, and were re-examined in accordance with the ASME subsection IWE to establish a baseline after the completion of the repairs. In order to demonstrate the adequacy of the repairs, these areas were also locally tested in accordance with the ASME Subarticle IWE-5000 as required by ASME IWA-4720. As shown in Table 1 of this submittal, the leakage rate from the post-repair leakage tests were zero scfh.

The visual inspections also identified that small areas of the vent system have experienced accelerated degradation caused by accumulation of water and end-of-service life of protective coating. None of these identified areas have challenged the leaktightness of the containment.

- C. For the leaktightness of seals, gaskets, and bolted connections, the licensee stated that with the approved interim extension in these areas it will perform an alternative test involving verification of the leaktight integrity of seals and gaskets in penetrations through the use of Appendix J, Type B testing. Containment bolting is being examined during

each inspection period; these examinations will not be affected by the extension of the Type A test frequency.

- D. With regard to the leaktight integrity of containment bellows, the licensee stated that the BSEP containment employed a single-ply stainless steel (SA240, Type 304) bellows design. These containment bellows are located inside the suppression chamber and are insulated by a protective metal cover (coated carbon steel). The controlled nitrogen-filled atmosphere of the suppression chamber, the protective cover over the bellows, and the location ensure an environment that is resistant to stress corrosion cracking.

For the uninspectable areas of the leaktight boundary, the licensee stated that the potential for containment leakage was factored in the risk assessment. The assessment includes specific classes that address extending the ILRT interval (Classes 3a and 3b). These cases considered the potential that the leakage is caused by a liner failure. The analysis results showed that even with the increased potential to have an undetected containment flaw or leak path, the increase in risk is small.

Based on the foregoing, the NRC staff concludes that a one-time extension of the current 10-year Type A test interval to a 12-year, 2-month interval is acceptable

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of North Carolina official was notified of the proposed issuance of the amendment. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATIONS

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes the surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (67 FR 926). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

#### 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with the Commission's regulations; and, (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Date: November 21, 2002

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