

March 6, 2002

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1 - ISSUANCE OF
AMENDMENT REGARDING CONTAINMENT LEAKAGE RATE TESTING
PROGRAM (TAC NO. MB3470)

Dear Mr. Keenan:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 216 to Facility Operating License No. DPR-71 for Brunswick Steam Electric Plant (BSEP), Unit 1. The amendment changes the Technical Specifications (TS) in response to your submittal dated November 26, 2001, as supplemented January 31, 2002, February 5, 2002, and February 11, 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 1. Specifically, the amendment allows a one-time interval increase for the BSEP, Unit 1 Type A, Integrated Leakage Rate Test for no more than 3 years, 2 months. In the February 11, 2002, letter, CP&L committed to submit a risk assessment including the consequences of the class 7 accident before Refueling Outage 14. The balance of your November 26, 2001, request for BSEP, Unit 1, will be evaluated in a separate transmittal after receipt of this evaluation.

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 by J.Goshen Acting for/

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

Docket No. 50-325

Enclosures:

1. Amendment No. 216 to License No. DPR-71
2. Safety Evaluation

cc w/enclosures: See next page

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CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 216
License No. DPR-71

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, 2002, February 5, 2002, and February 11, 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-71 is hereby amended to read as follows

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 216, 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/

Richard P. Correia, 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: March 6, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 216

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

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. 216 TO FACILITY OPERATING LICENSE NO. DPR-71
CAROLINA POWER & LIGHT COMPANY
BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1
DOCKET NO. 50-325

1.0 INTRODUCTION

By letter dated November 26, 2001, as supplemented January 31, 2002, February 5, 2002, and February 11, 2002, the Carolina Power & Light Company (CP&L, the licensee) submitted a request for changes to the Brunswick Steam Electric Plant (BSEP), Unit 1, 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 1 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. The reduction in the requested extension is bounded by the initial proposed no significant hazards consideration determination.

This Safety Evaluation only evaluates the request for a one-time interval increase for the BSEP, Unit 1, Type A, ILRT for no more than 3 years, 2 months. The balance of the licensee's November 26, 2001, request for BSEP, Units 1 and 2, will be evaluated in a separate transmittal.

2.0 BACKGROUND

10 CFR Part 50, Appendix J, Option B requires a Type A test to be conducted at a periodic interval based on the historical performance of the overall containment system. BSEP, Unit 1 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 1, 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 15, 1991, Type A test shall be performed no later than April 15, 2004.

Thus, the proposed TS changes would allow BSEP, Unit 1, a one-time extension of the current 10-year Type A test interval to a 13-year, 2-month interval from the last successful test performed on February 15, 1991.

3.0 EVALUATION

3.1 Probabilistic Risk Assessment Evaluation

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 13 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 NRC's rulemaking basis, NEI undertook a similar study. The results of that study are documented in 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 that a leak detectable only by a Type A test goes undetected, from 18 to 60 months. 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 (PWR) and Boiling Water Reactor (BWR) 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:

1. 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 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.
2. RG 1.174 provides guidance for determining the risk impact of plant-specific changes to the licensing basis. RG 1.174 defines very small changes in the risk-acceptance guidelines as increases in CDF less than 10^{-6} per reactor year and increases in LERF less than 10^{-7} per reactor year. Since the Type A test does not impact CDF, the relevant criterion is LERF. The increase in LERF resulting from a change in the Type A test interval from 1 in 10 years to 1 in 15 years is estimated to be 5.1×10^{-8} /year. 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 1.5×10^{-7} /year.

There are two major conservatisms in the delta LERF estimate by the licensee. First, the class 3B frequency was based on the CDF, which includes containment bypass sequences. Including this type of sequence is conservative because the containment would be bypassed whether or not there was an undetected preexisting flaw in the containment liner. Second, there is some probability 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. If one assumes a 50 percent probability that the containment liner flaw would be detected by the IWE visual examination process, then the delta LERF would go from $1.5\text{E-}07$ to $7.5\text{E-}08$. Increasing the Type A interval to 15 years is considered to be 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.

3. 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. The change in the conditional containment failure probability was estimated to increase by 0.0010 for the proposed change and 0.0031 for the cumulative change of going from a test interval of 3 in 10 years to 1 in 15 years. The staff finds that the defense-in-depth philosophy is maintained based on the change in the conditional containment failure probability for the proposed amendment.

The staff recognizes the limitations of a conditional containment failure probability approach. For plants such as BSEP, with core damage frequency estimates well below 10^{-4} , the ability of the containment to withstand events of even lower probability becomes less clear. Therefore, it is important to consider other risk metrics in conjunction with the conditional containment failure probability such as total LERF. The licensee has sufficiently demonstrated that the total LERF for internal events is less than 10^{-5} for the purpose of this evaluation.

Based on these conclusions, the 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 for BSEP, Unit 1, of 5 years, 1 month in its November 26, 2001 submittal. The licensee revised the interval extension request for BSEP, Unit 1, for up to 3 years, 2 months, in its February 11, 2002, supplement. The staff has reviewed this request and finds the interval extension for up to 3 years, 2 months acceptable. The basis for acceptability is as follows:

- A. 10 CFR Part 50, Appendix J, Option B 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 program at BSEP, Unit 1, was developed in accordance with Subsection IWE and IWL of ASME, Section XI, 1992 Edition with the 1992 Addenda. Visual inspections under this program were performed on the accessible area of the Unit 1 primary containment, including areas of augmented inspections. The visual inspections 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. The staff has concluded that more information is required before the it can determine whether an interval extension for the full 5 years, 1 month initial request is acceptable. The licensee has committed to submit to the staff a risk assessment including the consequences of the Class 7 accident before Refueling Outage 14. The staff will perform an additional evaluation for a one-time extension of Appendix J, Type A, integrated leak rate test interval (up to 15 years) for BSEP, Unit 1, after receipt of this submittal.

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.

Principal Contributors: J. Pulsipher, M. Snodderly, and H. Asher

Date: March 6, 2002

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