

June 18, 2003

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 - ISSUANCE OF
AMENDMENT RE: PRESSURE-TEMPERATURE LIMIT CURVES
(TAC NOS. MB5579 AND MB5580)

Dear Mr. Keenan:

The Commission has issued the enclosed Amendment No. 228 to Facility Operating License No. DPR-71 and Amendment No. 256 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant, Units 1 and 2. The amendments change the Technical Specifications in response to your submittal dated June 26, 2002, as supplemented November 22, 2002.

The amendments change the Technical Specifications related to the pressure-temperature limit curves.

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 Nos. 50-325
and 50-324

Enclosures:

1. Amendment No. 228 to
License No. DPR-71
2. Amendment No. 256 to
License No. DPR-62
3. Safety Evaluation

cc w/enclosures: See next page

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ADAMS ACCESSION NUMBER ML031690683(Letter)

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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. 228

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 June 26, 2002, as supplemented November 22, 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. 228, 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 by K.Jabbour Acting for/

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: June 18, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 228

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.

Remove Pages

3.4-21
3.4-23
3.4-24
3.4-25
3.4-26
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Insert Pages

3.4-21
3.4-23
3.4-24
3.4-25
3.4-26
3.4-27
3.4-28

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 256
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 June 26, 2002, as supplemented November 22, 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. 256, 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 by K.Jabbour Acting for/

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: June 18, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 256

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.

Remove Pages

3.4-21
3.4-23
3.4-24
3.4-25
3.4-26
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Insert Pages

3.4-21
3.4-23
3.4-24
3.4-25
3.4-26
3.4-27
3.4-28

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 228 TO FACILITY OPERATING LICENSE NO. DPR-71
AND AMENDMENT NO. 256 TO FACILITY OPERATING LICENSE NO. DPR-62
CAROLINA POWER & LIGHT COMPANY
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
DOCKET NOS. 50-325 AND 50-324

1.0 INTRODUCTION

By letter dated June 26, 2002, Carolina Power & Light Company (CP&L), the licensee for Brunswick Steam Electric Plant (BSEP), Units 1 and 2, submitted information and requested changes to the Technical Specifications (TS) to revise the pressure-temperature (P-T) curves to 32 effective full-power years (EFPY) of operation (Reference 1). Additional information was submitted on November 22, 2002 (Reference 2).

The current P-T limits will expire at 19 EFPY. CP&L is proposing a new set of P-T curves based on recalculated fluence values for 32 EFPY. However, the fluence values were calculated by Westinghouse Electric Company, LLC (W). W is qualified for pressurized-water reactor (PWR) fluence calculations but does not have demonstrated expertise in boiling-water reactors (BWRs). The Nuclear Regulatory Commission (NRC) staff requested that W qualify its methodology for the BSEP plant-specific application. The information for this qualification was submitted in Reference 2. The November 22, 2002, letter provided clarifying information only and did not change the initial proposed no significant hazards consideration determination or expand the scope of the initial application.

The purpose of this review is to examine the acceptability of the W methodology and the calculated fluence values for the BSEP 32 EFPY application.

2.0 REGULATORY EVALUATION

The fluence calculation must meet the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, General Design Criteria (GDC) 14, 30 and 31. The NRC staff issued Regulatory Guide (RG) 1.190, which satisfies the requirements of GDC 14, 30, and 31. Therefore, a fluence computation methodology that adheres to the guidance of RG 1.190 is acceptable.

3.0 TECHNICAL EVALUATION

The W fluence calculations for BSEP Units 1 and 2 had accounted for a power uprate of 120 percent over the original power level. The method of analysis is based on the

DOORS-3.1 code and the BUGLE-96 cross-section library (References 3 and 4). The anisotropic scattering was treated with a P_3 approximation and the angular quadrature with an S_8 approximation. The application used 114 radial and 99 azimuthal intervals and a 10^{-3} inner iteration convergence criterion. Finally, all fissionable materials were accounted for in the calculation of the source and the spectrum. The above code, cross sections, approximations, and interval sizes conform to the guidance of RG 1.190, and the results of the calculations are, therefore, acceptable.

In response to the NRC staff request for additional information, the licensee submitted calculations for the pool critical assembly (PCA) pressure vessel benchmark (Reference 5), the H. B. Robinson pressure vessel benchmark (Reference 6), and the NUREG/CR-6115 calculational benchmark (Reference 7). The licensee also provided the results of the analyses for two in-vessel surveillance capsules (one from each unit) and ex-vessel dosimetry (from both units) taken at azimuthal angles of 45° , 135° , 225° , and 315° .

3.1 The PCA Pressure Vessel Benchmark

W chose the PCA configuration 12/13 as the closest to the BWR geometry. In this arrangement, the core-to-vessel distance is 29.7 cm. This is smaller than a typical BWR arrangement. However, because the core in the PCA experiment is of limited height, a larger distance would have introduced distortions.

W performed the analysis of the measurements using the same cross sections and approximations proposed for the reactor analysis. The objective was to calculate the measured activation of $Al^{27}(n,\alpha)$, $Ni^{58}(n,p)$, $In^{115}(n,n')$, $Rh^{103}(n,n')$, $U^{238}(n,f)$, and $Np^{237}(n,f)$. The dosimeters were placed at distances from 12.0 to 59.1 cm. Both the synthesis and the three-dimensional solutions were used. The results are in very good agreement with the measurements, except that for the 59.1 cm position, the synthesis method seems to break down; however, this position represents a point well beyond the vessel. The three-dimensional solution is in excellent agreement throughout the measurement region. The results of this benchmark demonstrate excellent calculational capability.

3.2 The H. B. Robinson Pressure Vessel Benchmark

The licensee presented a calculation of the H. B. Robinson pressure vessel fluence standard (Reference 6). The NRC staff attributes low relevance of a PWR calculation for a BWR benchmarking. Therefore, it is reviewed in the general context of code capabilities. The calculation adheres to the RG 1.190 guidance.

W used the DOORS-3.1 code in the H. B. Robinson benchmark calculation with the BUGLE-96 cross-section library. The P_3 scattering and the S_8 citriodora approximations were used. The code was operated in the "synthesis" mode using the (r,θ) , (r,z) , and (r) calculations with spatial mesh arrays of (155, 97), (137, 223), and (137), respectively. Materials and sources were obtained from the Oak Ridge National Laboratory Report NUREG/CR-6453 (Reference 6). A comparison of measured and calculated dosimeter activations at the 20° azimuthal showed excellent agreement, indicating excellent code capability for a PWR calculation.

3.3 Analysis of the NUREG/CR-6115 Calculational Benchmark

This is a much more relevant benchmarking calculation than the H. B. Robinson benchmark. The methodology is the same as in the H. B. Robinson case, and also follows the guidance in RG 1.190. Geometry and material distribution were obtained from NUREG/CR-6115. Solutions were obtained using the standard P_3 and S_8 approximations as well as the higher order approximations P_5 and S_{16} . The spatial meshes for (r,θ) , (r,z) , and (r) were chosen as (228, 102), (228, 111), and (111), respectively. Azimuthal flux distributions at the core midplane at several radial distances and at two locations off the midplane showed excellent agreement. This is a conclusive benchmark on the ability of the methodology to calculate a BWR arrangement.

3.4 Brunswick Units 1 and 2 Operating Plant Comparisons

One capsule has been removed from each BSEP unit from the 30° azimuthal location. In addition, during Cycle 6 both units were equipped with ex-vessel dosimetry. The measured results from the in-vessel and ex-vessel dosimetry were compared to the calculated values. The methodology, cross sections, and approximations are the same as for the NUREG/CR-6115 and H. B. Robinson cases. The in-vessel dosimetry included Cu-63, Fe-54, and Ni-58 foils for Unit 1, and Fe-54 and Ni-58 for Unit 2. Individual foil values were not provided; however, the comparison of the measured to calculated values for each dosimeter type showed good agreement. The mean values for both units compared even better and were well within the limits of RG 1.190.

The measured vs. calculated values for the ex-vessel dosimetry also compared very well. The values of full-core height traverses were plotted on semilogarithmic paper, which obscures large differences, but the mean and standard deviations are well within RG 1.190 guidance. The code performed very well at the upper and lower ends of the active fuel, although the synthesis method usually breaks down in these regions.

This plant-specific benchmark is the most relevant and indicates that the W methodology satisfies the RG 1.190 guidelines, and is acceptable for BSEP plant-specific applications. Because W used a qualified methodology, the calculated fluence values for 32 EFPY are acceptable.

3.5 Summary

The licensee submitted information and requested TS changes to extend the applicability of the P-T curves to 32 EFPY. The pressure vessel fluence values at 32 EFPY was calculated by W, which does not have a demonstrated capability in BWR fluence calculations. The NRC staff requested additional information to establish that W is qualified to perform BSEP plant-specific fluence calculations. The NRC staff's review of the submitted information found that the methodology adheres to the guidance in RG 1.190. Likewise, the plant-specific results are within the uncertainty limits in RG 1.190. The NRC staff finds these results acceptable, including the proposed fluence values and proposed revised P-T curves for operation of the BSEP units to 32 EFPY.

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 amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 change the Surveillance Requirements. The NRC staff has determined that the amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding (67 FR 50949). Accordingly, the amendments meet 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 amendments.

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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter from J.S. Keenan, Carolina Power & Light Company, to USNRC, "Request for License Amendments to Revise Technical Specification Pressure temperature Limit Curves," dated June 26, 2002.
2. Letter from J.S. Keenan, Carolina Power & Light Company, to USNRC, "Response to Request for Additional Information, Proposed License Amendment to Revise Pressure-Temperature Curve Limits," dated November 22, 2002.
3. DOORS-3.1, "One- Two- and Three-Dimensional Discrete Ordinates Neutron/Photon Transport Code System," RSICC Computer Code Collection CCC-650, August 1996.
4. BUGLE-96, "Coupled 47 Neutron, 20 Gamma-Ray Group Cross Section Library Derived from ENDF/B-VI for LWR Shielding and Pressure Vessel Dosimetry Applications," March 1996.
5. NUREG/CR-6454, "Pool Critical Assembly Pressure Vessel Benchmark," I. Remec and F.B.K. Kam, Oak Ridge National Laboratory, July 1997.

6. NUREG/CR-6453, "H. B. Robinson Pressure Vessel Benchmark," Oak Ridge National Laboratory, February 1998.
7. NUREG/CR-6115, "PWR and BWR Pressure Vessel Fluence Calculation Benchmark Problems and Solutions," Brookhaven National Laboratory, September 2001.

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Date: June 18, 2003

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Brunswick Steam Electric Plant
Units 1 and 2

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