Docket Nos. 50-325
and 50-324

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Mr. Lynn W. Eury
Executive Vice President
Power Supply
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

September 12, 1991

Dear Mr. Eury:

SUBJECT: ISSUANCE OF AMENDMENT NO. 154 TO FACILITY OPERATING LICENSE NO. DPR-71 AND AMENDMENT NO. 186 TO FACILITY OPERATING LICENSE NO. DPR-62 REGARDING CHANGES OF OPERATING LICENSE EXPIRATION DATES - BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 (TAC NOS. 66082 and 66083)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 154 to Facility Operating License No. DPR-71 and Amendment No. 186 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant, Units 1 and 2 (BSEP1 and BSEP2). The amendments change the expiration dates of the licenses in response to your submittal dated August 17, 1987, as supplemented May 30 and June 29, 1990, and August 8, and August 29, 1991.

The amendments change the licenses to extend the license expiration dates from February 7, 2010, to September 8, 2016, for BSEP1, and from February 6, 2010, to December 27, 2014, for BSEP2.

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,
Original signed by

Brenda Mozafari, Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 154 to License No. DPR-71
2. Amendment No. 186 to License No. DPR-62
3. Safety Evaluation

cc w/enclosures:
See next page

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*See Previous Concurrence

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

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 154
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 August 17, 1987, as supplemented May 30 and June 29, 1990, and August 8 and August 29, 1991, 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, Facility Operating License DPR-71 is hereby amended by changing paragraph 2.H. as follows:

   2.H. This license is effective as of the date of issuance and shall expire at midnight on September 8, 2016.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Elinor G. Adensam, Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Date of Issuance: September 12, 1991

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

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 186
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 August 17, 1987, as supplemented May 30 and June 29, 1990, and August 8 and August 29, 1991, 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, Facility Operating License DPR-62 is hereby amended by changing paragraph 2.E. as follows:

   E. This license is effective as of the date of issuance and shall expire at midnight on December 27, 2014.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/s/
Elinor G. Adensam, Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Date of Issuance: September 12, 1991

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 154 TO FACILITY OPERATING LICENSE NO. DPR-71

AND AMENDMENT NO. 186 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 August 17, 1987, as supplemented May 30 and June 29, 1990, Carolina Power & Light Company (CP&L or the licensee) requested amendments to Facility Operating Licenses DPR-71 and DPR-62 for the Brunswick Steam Electric Plant, Units 1 and 2 (BSEP1 and BSEP2). The proposed amendments would extend the expiration dates of these licenses from February 7, 2010, to September 8, 2016, for BSEP1, and from February 6, 2010, to December 27, 2014, for BSEP2, effectively recapturing the construction time as operating time. The letters provided by the licensee on August 8 and August 29, 1991, provided clarification and did not alter the requested action or staff findings.

2.0 DISCUSSION

Title 10 of the Code of Federal Regulations, Section 50.51 (10 CFR 50.51), specifies that each license will be issued for a fixed period of time not to exceed 40 years from the date of issuance. The current term shown in the licenses for BSEP1 and BSEP2 is 40 years commencing with the issuance of the construction permit. Accounting for the time that was required for construction, the effective operating license terms were 33 years and 5 months for BSEP1, and 35 years and 2 months for BSEP2. Consistent with 10 CFR 50.51 of the Commission's regulations, the licensee, by the August 17, 1987, application, requested extensions of the operating license times for BSEP1 and BSEP2. This request would set the fixed periods of the licenses from the dates of issuance of the operating licenses rather than from the dates of the construction permits.

3.0 EVALUATION

The staff has evaluated the safety issues associated with issuance of the proposed license amendments. These proposed amendments would allow additional periods of operation of 6 years, 7 months for BSEP1 and 4 years, 10 months, for BSEP2. The issues addressed consist of additional radiation exposure to the licensee's operating staff, potential increased impacts on the offsite population, and the general aging of plant structures

and equipment. The impact of additional radiation exposure to the facility operating staff and the impact on the general population in the vicinity of BSEP are addressed in the NRC staff's Environmental Assessment (56 FR 46016) dated September 9, 1991.

The licensee discussed the impact of license extension on major, difficult to replace components, equipment and plant structures in their May 30, 1990, letter. The items considered in this category are reactor vessel, mechanical equipment, and plant structures.

BSEP was designed for a 40-year operating life. The reactor vessels, which are generally regarded as the limiting item for the purpose of plant operating life, were designed for 40 years of normal operation. Mechanical equipment is designed for 40 years of operation and is subjected to comprehensive surveillance and maintenance programs to assess aging (including the Inservice Inspection (ISI) Program and Inservice Testing Program). Related electrical equipment is also designed for 40 years of operation or is subject to the Environmental Qualification (EQ) Program.

3.1 Reactor Vessels and Internals

The BSEP reactor vessels were designed and fabricated to meet the requirements of 10 CFR 50.55a and Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME Code) (1965 Edition, including Summer 1967 Addenda). The licensee has stated that the vessels will retain structural integrity throughout their design life with an adequate margin. The detailed designs and analyses were performed by Chicago Bridge and Iron Company and were approved by General Electric Company. The reactor vessel analyses were performed in three parts: thermal evaluation, stress calculations, and fatigue evaluations. All areas were qualified with adequate margin for the design life of 40 years.

The BSEP reactor vessels and associated surveillances comply with the requirements of 10 CFR Part 50, Appendix H and the ASME Code, Section XI. As required by 10 CFR Part 50, Appendix H, a reactor vessel material surveillance program was established at the time the operating licenses were issued to monitor the effects of radiation-induced changes on the material properties of the reactor vessel. BSEP established a surveillance capsule withdrawal schedule which uses three capsules. By letter dated October 26, 1988, the licensee proposed revisions to the surveillance capsule withdrawal schedule in accordance with 10 CFR Part 50, Appendix H, paragraph II.B.3. The revised schedule was intended to be more compatible with boiling water reactor irradiation conditions and the BSEP materials. The NRC staff subsequently approved the withdrawal schedule revisions by issuance of Amendment Nos. 140 and 172 to the Facility Operating Licenses, dated February 15, 1990. The reactor material surveillance program requires the surveillance capsules to be withdrawn and examined to determine radiation-induced changes in material properties of the reactor vessels. The data from the surveillance capsules will be used as described in 10 CFR Part 50, Appendix G, Sections IV and V and, based on the observed changes, the pressure/temperature limit curves along with surveillance

capsule withdrawal schedules will be revised and submitted to the NRC staff for review and approval in accordance with Section III of 10 CFR Part 50, Appendix H. Therefore, the BSEP reactor vessel surveillance program complies with the requirement of 10 CFR Part 50, Appendix H, and provides adequate assurance that the reactor vessel will be monitored for radiation-induced changes in material properties, throughout the licensed life of the plant including the proposed extension periods.

The licensee stated that, based on plant operating history and a projected 75 percent capacity for the remainder of the proposed 40 calendar year operating life of the plant, BSEP 1 is expected to achieve 26.9 effective full power years (EFPY) of operation. BSEP 2 is expected to achieve 25.8 EFPY of operation. Based on the licensee's operating projections and the resulting vessel irradiation, the most limiting transition temperature shifts are estimated to be 52° F (ID) and 45° F (1/4T) for BSEP 1 and 72° F (ID) and 63° F (1/4T) for BSEP 2. Thus, the licensee expects that the transition temperature shifts at the end of 40 calendar years of plant life will be less than 100° F, and the use of three surveillance capsules, as required by ASTM E 185-82, remains adequate.

The ISI Program for the BSEP reactor vessels is based on the requirements of the ASME Code, Section XI, and applicable supplementary requirements. The objective of the ISI Program is to observe if any age-related degradation occurs before it can significantly encroach on design margins. Industry experience has shown that the quality of inspections and the extent of vessel regions inspected are constantly increasing. The ISI Program provides an ongoing confirmation of structural integrity of the reactor vessels during their entire operating life, including the proposed extension periods.

Based on the above, it is concluded that the BSEP reactor vessels are fully qualified for 40 years of plant operation.

The design of the BSEP reactor internals is in accordance with the applicable portions of Section III of the ASME Code, 1965 Edition through and including the Summer 1967 Addenda. The design evaluation included a fatigue assessment for the 40-year plant operational period in accordance with the ASME Code. The major components within the reactor vessel were subjected to extensive testing on a prototype plant coupled with a dynamic system analysis of BSEP to properly describe any resulting flow induced phenomena incurred from normal plant operation and from anticipated operational transients. Possible contributory sources of vibration were postulated from pump operation, flow-induced vibration caused by cross and/or parallel flow, and turbulent flow. All flow-induced vibratory stresses were well within the fatigue allowable stresses established by the ASME Code. Based on the above, it is concluded that the BSEP reactor internals are fully qualified for 40 years of plant operation.

3.2 Mechanical Equipment

At the time of licensing, the NRC concluded that the design of pressure retaining mechanical fluid systems within the boundaries of Atomic Energy Commission (AEC) Safety Classification A, B, and C were designed and

constructed in accordance with design criteria consistent with the codes listed in Regulatory Guide 1.26 and in conformance with Section 50.55a of 10 CFR Part 50. The NRC further concluded that compliance with the above design criteria provided reasonable assurance that the components' quality level was adequate to safely withstand the plant design loading conditions and the combination of loadings which the systems may experience over the service lifetime without loss of structural integrity. In addition, the NRC determined that the components satisfied the requirements of AEC General Design Criteria 1, 14, and 30.

As support for the proposed license amendment, CP&L has considered the potential effect of the operating license extension on mechanical equipment and concludes that there will be no impact. Mechanical equipment for the BSEP was specified to have a design life for 40 years of operation or is subject to surveillance, testing, and maintenance requirements to detect degradation and ensure corrective action. For example, the nuclear steam supply system mechanical equipment was designed and procured for a 40-year design life. All safety-related piping systems, including piping supports were analyzed for a 40-year design life, using NRC-approved methods and computer codes, and conformed to the ASME B31.1.0 Power Piping Code, 1967 Edition.

It was, and continues to be, understood that some items of equipment and subcomponents are not expected to last 40 years. Surveillance, maintenance, and testing of mechanical equipment are performed to verify operability of the equipment or detect potential degradation and ensure that, when required, equipment is replaced or some other appropriate action is taken. In addition, subcomponents such as nonmetallics (e.g., gaskets, O-rings) are inspected and periodically replaced, as necessary, as part of routine maintenance in order to ensure that the design life of the equipment will be achieved.

These surveillance activities provide the necessary assurance that mechanical equipment will be maintained throughout the operating life of the plant, including the proposed license extension period.

3.3 Electrical Equipment

Safety-related electrical equipment installed in the BSEP was designed for a full 40-year operating life. Exceptions include those cases where the equipment has some consumable quantity (e.g., neutron monitoring detectors and batteries,). Equipment maintenance (where required or anticipated for both preventive and corrective purposes) has been considered within applicable plant maintenance procedures. For those cases where less than a 40-year design service life applies, maintenance activities include equipment and component replacement. Additionally, required maintenance surveillance testing practices have been implemented to maintain plant operating conditions within the plant Technical Specification (TS) limits.

The existing design considerations and ongoing maintenance practices provide assurance that BSEP safety-related electrical equipment will remain operable through a full 40-year plant operating life (i.e.,

through September 8, 2016, for BSEP1, and through December 27, 2014, for BSEP2).

The EQ program is one area in particular in which a programmatic activity is performed to maintain plant operating conditions within plant TS limits. The BSEP has in place an EQ program for safety-related electrical equipment and cables located in the potentially harsh environments of the primary and secondary containments, to comply with the requirements of 10 CFR 50.49. This program was found acceptable by the NRC, based upon a March 5, 1985, Safety Evaluation, as well as NRC audit inspections of the EQ Program during August 1985 and August 1989.

The BSEP EQ Program includes the consideration of a "qualified life" for each item of electrical equipment/cable within its scope. In many cases, equipment and cable qualified lives have been determined to be greater than 40 years from the date of initial plant operation. For those remaining cases where the qualified life has been determined to be less than 40 years, an EQ-related replacement and refurbishment process has been established, based upon EQ program documentation, and is being implemented as part of ongoing plant maintenance activities. Additional assurance of BSEP EQ equipment integrity was provided when a significant amount of equipment was replaced to assure compliance with 10 CFR 50.49. In addition, EQ-related cable replacements in upper drywell elevations have been or will be performed for each unit based upon higher ambient temperature experienced to date (relative to operating conditions at lower drywell elevations). Programmatic activities will continue to be performed irrespective of the proposed plant operating expiration date.

3.4 Structures

All Seismic Category I structures for BSEP, including the containment, the concrete and structural steel internal structures, and the foundations were reviewed and found acceptable by the NRC at the time of licensing. The structures were designed for dead loads, live loads, missiles, large break loss-of-coolant accidents (LOCA), small break LOCA, seismic events, hurricane loads, and tornado loads in accordance with the applicable codes. The pre-stressed, post-tensioned concrete girders which support the fuel pool, steam separator and dryer pool, and reactor well were designed in accordance with the required ASME Code, Section III, and American Concrete Institute Standard (ACI) - 318.

The reinforced concrete containment is generally known not to be susceptible to significant degradation with time. Nevertheless, the licensee has measures in place to ensure that any deterioration is detected and repaired. Throughout the service life of the plant, the containment structure is subject to the inspection and testing program of Appendix J. The Appendix J leak rate testing program is well documented

and provides reasonable assurance that the containment structure remains capable of performing its design function throughout the service life of the facility, including the proposed extension periods.

The plant's concrete and structural steel internal structures, including walls, compartments and floors, its other Seismic Category I structures (slabs, walls, beams and columns), and its foundations were found adequate to meet General Design Criteria 2 and 4. These structures are generally known not to be susceptible to significant age-related degradation. Nevertheless, surveillance and maintenance requirements set forth in the TS provide assurance of structural integrity and ensure that any degradation will be detected and repaired.

3.5. Siting

The NRC staff has concluded in its associated Environmental Assessment that the annual radiological effects during the proposed additional years of operation are not significantly greater than were previously estimated in the Final Environmental Statement. These radiological effects are within acceptable limits.

The Exclusion Area is owned by CP&L and the North Carolina Eastern Municipal Power Agency (NCEMPA) and controlled by CP&L. No one lives within this area. As discussed in the Updated Final Safety Analysis Report, all activities occurring within the exclusion area are either directly or indirectly related to plant operations. CP&L owns and operates a rail line within the exclusion area. An agreement with Pfizer Corporation permits them to operate on an extension of the rail line to the Pfizer Plant. This extension runs outside but parallel to a portion of the exclusion area with a 100-foot wide easement extending into the exclusion area. The easement allows Pfizer the right to operate the railroad, as well as maintain an access road and underground pipeline for water and effluents. Normal operation and maintenance of this portion of the track does not extend into the Exclusion Area. No change to these practices and conditions are anticipated through the requested extension periods for the operating licenses.

Projected changes in population within the Low Population Zone (LPZ), nearest population center distances and 10-mile radius Emergency Planning Zone (EPZ) have been found not to be significant for the period of the license extensions. Accordingly, the Commission's conclusions regarding 10 CFR Part 100 siting criteria for BSEP are that the Exclusion Area, the LPZ, and population center distances meet the guidelines of 10 CFR Part 100 and are not changed by the proposed license extensions.

The staff concludes from its evaluation of the design, operation, testing and monitoring of the mechanical equipment, structures, reactor vessels, and electrical equipment/components, and siting that an extension of the operating licenses for BSEP 1 and BSEP 2, to a 40-year service life is consistent with the FSAR and the Safety Evaluation Report (SER), as supplemented.

There is reasonable assurance that these units will continue to operate safely for the additional periods authorized by these amendments. The plants are operated in compliance with the Commission's regulations, and issues associated with plant degradation have been adequately addressed herein and in the previously issued evaluations relating to this matter.

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 CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32 and 51.35, an environmental assessment and finding of no significant impact have been prepared and published in the Federal Register on September 9, 1991 (56 FR 46016). Accordingly, based upon the environmental assessment, we have determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

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 Contributor: B. Mozafari

Date: September 12, 1991

AMENDMENT NO. 154 TO FACILITY OPERATING LICENSE NO. DPR-71 - BRUNSWICK, UNIT 1
AMENDMENT NO. 186 TO FACILITY OPERATING LICENSE NO. DPR-62 - BRUNSWICK, UNIT 2

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