May 5, 2006

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

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT ON SUPPRESSION CHAMBER-TO-DRYWELL VACUUM BREAKER STROKE TESTING (TAC NOS. MC7352 AND MC7353)

Dear Mr. Scarola:

The Commission has issued the enclosed Amendment No. 240 to Facility Operating License No. DPR-71 and Amendment No. 268 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant, Units 1 and 2. The amendments are in response to your application dated June 20, 2005.

The amendments revise the Technical Specification Surveillance Requirement 3.6.1.6.2 of 3.6.1.6, “Suppression Chamber-to-Drywell Vacuum Breakers” for the frequency of functionally testing the suppression chamber-to-drywell vacuum breakers.

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

Sincerely,

/RA/

Brenda L. Mozafari, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-325 and 50-324

Enclosures:
1. Amendment No. 240 to License No. DPR-71
2. Amendment No. 268 to License No. DPR-62
3. 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. 240
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 20, 2005, 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. 240, 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/

Michael L. Marshall, Jr., Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 5, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 240

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

Replace page 3 of Operating License No. DPR-71 with the attached page, which revised the Amendment Number in paragraph (2).

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the areas of change.

Remove Page	Insert Page
3.6 - 19	3.6 - 19

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 268
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 20, 2005, 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. 268, 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/

Michael L. Marshall, Jr., Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: May 5, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 268

FACILITY OPERATING LICENSE NO. DPR-62

DOCKET NO. 50-324

Replace page 4 of Operating License No. DPR-62 with the attached page, which revised the Amendment Number in paragraph (2).

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the areas of change.

Remove Page	Insert Page
3.6 - 19	3.6 - 19

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 240 TO FACILITY OPERATING LICENSE NO. DPR-71

AND AMENDMENT NO. 268 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 to the Nuclear Regulatory Commission (NRC), dated June 20, 2005, the Carolina Power & Light Company (the licensee) submitted a request for changes to the Brunswick Steam Electric Plant, Units 1 and 2, Technical Specifications (TS). The amendment proposes, in part, changes to TS to revise Surveillance Requirement (SR) 3.6.1.6.2. Specifically, the changes would decrease the frequency of functional (i.e., stroke) testing of the suppression chamber-to-drywell vacuum breakers from every 31 days to every 92 days. Also, there are changes to the conditions under which steam discharges to the suppression chamber would require additional functional testing.

2.0 REGULATORY EVALUATION

The Brunswick design was reviewed for construction under the "General Design Criteria for Nuclear Power Plant Construction" issued for comment by the Atomic Energy Commission in July 1967 and is committed to meet the intent of the General Design Criteria (GDC), published in the *Federal Register* on May 21, 1971, as Appendix A to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50. “Appendix A” establishes the fundamental regulatory requirements with respect to containment design. Specifically, GDC 16, "Containment Design," states that reactor containment and associated systems shall be provided to establish an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment and to assure that the containment design conditions important to safety are not exceeded for as long as postulated-accident conditions require.

In order to satisfy, in part, the requirements of GDC 16, Section 6.2.1.1.C, "Pressure-Suppression Type BWR [Boiling Water Reactor] Containments," of NUREG-0800, "Standard Review Plan" (Ref. 1), specifies that vacuum relief devices be provided to protect the containment against loss of integrity from negative pressure transients or postaccident atmosphere cooldown. The required function of the suppression chamber-to-drywell vacuum breakers is to ensure that a loss of containment integrity will not result from negative pressure transients or postaccident atmosphere cooldown.

Currently, SR 3.6.1.6.2 requires the performance of functional testing of each vacuum breaker every 31 days and within 12 hours after any discharge of steam to the suppression chamber from any source.

The proposed change revises the SR to require the performance of functional testing of each vacuum breaker every 92 days, within 12 hours after any discharge of steam to the suppression chamber from the safety/relief valves, and within 12 hours following an operation that causes any of the vacuum breakers to open.

3.0 TECHNICAL EVALUATION

3.1 Background

3.1.1 Vacuum Breaker Functions

Each Brunswick unit is equipped with 10 suppression chamber-to-drywell vacuum breakers located on the vent header between the drywell and the suppression chamber. The vacuum breakers have two safety functions: (1) to relieve a vacuum in the drywell during a loss-of-coolant accident (LOCA), for which they must open; and (2) to otherwise remain closed to prevent steam from a LOCA from leaking through from the drywell to the suppression chamber air space, thereby bypassing the suppression pool and not being condensed, which could overpressurize the suppression chamber.

If a LOCA were to occur, most of the noncondensible gases in the drywell would be blown into the suppression chamber as the drywell becomes pressurized with steam. After the blowdown, a vacuum would occur in the drywell as the steam condensed. A negative pressure could also occur due to inadvertent drywell spray actuation during normal operation. If the drywell vacuum were not relieved, the drywell could buckle (i.e., implode). The design negative pressure for the containment is 2.0 pounds per square inch differential (psid). With 8 of the 10 suppression chamber-to-drywell vacuum breakers operable for the purpose of opening, the capability for noncondensible gases in the suppression chamber to pass back into the drywell is assured to restore pressure in the drywell. The degree of redundancy provided through the use of multiple vacuum breakers provides a high level of assurance that the drywell is protected from buckling.

At the beginning of a LOCA, the suppression chamber-to-drywell vacuum breakers must be closed for the suppression pool to provide its steam quenching function. If a suppression chamber-to-drywell vacuum breaker were not closed, a drywell bypass pathway to the suppression pool would exist, resulting in the potential for primary containment overpressurization due to the bypass leakage. The maximum allowable amount of bypass leakage area is equivalent to a 24-inch pipe for a large break LOCA and equivalent to a 6-inch pipe for a small break LOCA. TS 3.6.1.6, ACTION B.1 requires all open suppression chamber-to-drywell vacuum breakers to be closed or a plant shutdown to be initiated within 4 hours.

3.1.2 Vacuum Breaker Design

The suppression chamber-to-drywell vacuum breakers are located in the suppression chamber air space attached to the drywell vent system. The vacuum breaker is a swing-check device, with a 20-inch flapper or "pallet" that self-actuates to open under a differential pressure of 0.5 psi. Magnetic latches are provided to prevent chattering and vibration.

Each vacuum breaker is equipped with a pneumatically-powered stroke test actuator that enables control room personnel to remotely stroke the vacuum breaker as a demonstration of operability. Redundant, proximity-type limit switches are provided to indicate when the pallet is in the fully-closed position. Another mechanical limit switch is provided to indicate that the pallet is in the fully open position. The test actuators are not classified as safety-related devices and have not been tested under LOCA conditions.

3.1.3 Vacuum Breaker Historical Performance

A failure of a vacuum breaker to re-close occurred at Brunswick, Unit 2, in July 2004. A faulty test actuator was a contributing cause to the failure of the vacuum breaker to close during surveillance testing. This event was reported in Licensee Event Report 2-2004-002 (ADAMS Accession Number ML042790475). Several other cases have been recorded since 1986 (e.g., the Hatch Plant in 1986, the Quad Cities Plant in 1987, the Fermi Plant in 1992) during which a suppression chamber-to-drywell vacuum breaker has failed to re-close during testing. These failures were due to test actuator problems.

The actuating device used to test the vacuum breakers is susceptible to failure in a manner that can cause the vacuum breakers to fail open, which would render the suppression chamber inoperable due to the creation of a suppression chamber steam bypass pathway. During normal operation, the drywell and suppression chamber atmosphere is inerted with nitrogen to maintain low containment oxygen levels. To repair a suppression chamber-to-drywell vacuum breaker, the drywell and suppression chamber must be de-inerted to permit entry. De-inerting requires a plant shutdown. Therefore, in order to reduce the potential for an unplanned plant shutdown due to a stuck-open vacuum breaker, the licensee proposes a decrease in the test frequency for these vacuum breakers during power operation.

3.2 NRC Staff Evaluation

The proposed TS changes are of two types: (1) periodic surveillance testing, and (2) additional testing when certain conditions occur (i.e., steam discharge to the suppression chamber or vacuum breaker opening).

The staff finds the changes of the second type to be acceptable, because the changes are minor modifications that have little potential safety impact, and the changes are consistent with the standard TS (Ref. 2).

The change of the first type is to increase the periodic test interval from 31 to 92 days. A monthly surveillance frequency has been specified for the suppression chamber-to-drywell vacuum breakers since the earliest suppression chamber-equipped facilities were licensed. The NRC staff has historically maintained that the suppression chamber-to-drywell vacuum breaker stroke test should have a monthly frequency, based on the importance of the safety function, inaccessibility, and the harsh environment (i.e., the suppression chamber air space) in which the vacuum breakers are located.

The inservice testing (IST) requirements of the American Society of Mechanical Engineers (ASME) Section XI Code have historically specified a 3-month test frequency for stroke testing vacuum breakers. Although the Brunswick TS currently require testing of the vacuum breakers

once per 31 days, these vacuum breakers must also be tested quarterly in order to comply with the IST requirements of the ASME Code, Section XI, and 10 CFR 50.55a. The 92-day surveillance frequency being proposed for Brunswick is consistent with the quarterly test frequency specified in ASME Section XI Code requirements, for testing vacuum breakers.

The NRC staff has previously determined that vacuum breaker testing on a quarterly frequency or greater continues to ensure an acceptable level of quality and safety. In two of the precedents cited by the licensee (Refs. 3 and 4), the vacuum breaker testing frequency was set to be in conformance with the ASME Section XI requirements, along with various other components (e.g., pumps) and without any particular consideration of the suppression chamber-to-drywell vacuum breakers individually. However, in the third precedent cited by the licensee (Ref. 5), the NRC staff's safety evaluation gave detailed and specific consideration of the suppression chamber-to-drywell vacuum breakers as unique and specially situated components. Based on these vacuum breakers being passive devices, the degree of redundancy provided through the use of multiple vacuum breakers (i.e., ensuring the drywell is protected from buckling), and that historically no vacuum breakers have failed to open during testing (i.e., due to problems with the vacuum breaker itself), the NRC staff's safety evaluation found it acceptable to decrease the testing frequency, not only to quarterly but less frequent, to once per cold shutdown if not performed within the previous 92 days.

Considering these precedents, and for the same reasons cited in these precedents, the NRC staff finds that the periodic testing frequency at Brunswick may be decreased from once per 31 days to once per 92 days.

The NRC staff's approval is based on the following findings:

1. Historically, failures of suppression chamber-to-drywell vacuum breakers to open during testing are rare (see Ref. 5).

2. With respect to the vacuum relief safety function, the suppression chamber-to-drywell vacuum relief system has double failure redundancy. Only 8 of 10 vacuum breakers are needed for vacuum relief for the limiting negative pressure event (i.e., three vacuum breakers must fail to open before the safety function would be compromised). Therefore, a high level of assurance is provided to protect the drywell from buckling. Such a level of assurance supports extended surveillance intervals.

3. It is critical that all vacuum breakers are closed during the blowdown phase of a LOCA. However, the vacuum breakers are normally closed. No motion is needed for them to perform their reverse-flow (flow-check) safety function. During the blowdown phase of a LOCA, the vacuum breakers are, thus, "passive" devices. For the short-term phase of a LOCA, regulatory criteria do not postulate a passive failure such as a failure of these valves to remain closed.

4. Each vacuum breaker has redundant safety-grade position indicators for the closed position. Thus, a high degree of assurance is apparent that an open vacuum breaker would not go undetected during plant operation and that no steam bypass pathway would exist due to an open vacuum breaker in case a LOCA occurs.

5. Unlike typical swing-check valves for which ASME Section XI authorizes a 3-month stroke test interval, the suppression chamber-to-drywell vacuum breakers are provided with magnetic latching to minimize vibrational wear. This factor further supports extended surveillance intervals.

Based on the foregoing safety evaluation, the NRC staff finds that the functional testing frequency changes proposed for Brunswick in TS SR 3.6.1.6.2 are 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 amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change 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 hazard's consideration, and there has been no public comment on such finds (70 FR 48202). 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. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Reactors," dated July 1981.

2. NUREG-1433, Volume 1, Revision 3, "Standard Technical Specifications General Electric Plants, BWR/4," dated June 2004 (ADAMS Accession No. ML041910194).

3. Letter from S. Black (NRC) to O. Kingsley, Jr. (Tennessee Valley Authority), "Browns Ferry Technical Specifications Change to Reflect Revised ASME Section XI Pump and Valve Program (TAC Nos. 00250/251/252) (TS 235)," dated November 22, 1988 (ADAMS Accession No. ML020020334).

4. Letter from M. Fairtile (NRC) to L. Tremblay (Vermont Yankee Nuclear Power Corporation), "Issuance of Amendment No. 128 to Facility Operating License No. DPR-28 - Vermont Yankee Nuclear Power Station (TAC No. 77221)," dated March 4, 1991 (ADAMS Accession No. ML011650067).

5. Letter from T. Colburn (NRC) to D. Gibson (Detroit Edison), "Fermi-2 - Issuance of Amendment Related to Torus to Drywell Vacuum Breaker Surveillance Testing (TAC No. M86062)," dated January 4, 1994 (ADAMS Accession No. ML020730463).

Principal Contributor: James C. Pulsipher

Date: May 5, 2006

cc:

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