



Progress Energy

Michael J. Annacone
Vice President
Brunswick Nuclear Plant

JUL 22 2010

SERIAL: BSEP 10-0083
TSC-2010-001 and TSC-2010-002

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Renewed Facility Operating License Nos. DPR-71 and DPR-62
Docket Nos. 50-325 and 50-324
Additional Information Supporting Requests for License Amendments –
Addition of Analytical Methodology Topical Report to Technical
Specification 5.6.5, "CORE OPERATING LIMITS REPORT (COLR)"

- References:
1. Letter from Michael J. Annacone to U.S. Nuclear Regulatory Commission, *Request for License Amendments – Addition of Analytical Methodology Topical Report to Technical Specification 5.6.5, "CORE OPERATING LIMITS REPORT (COLR),"* dated April 29, 2010 (ADAMS Accession Number ML101310388)
 2. Letter from Michael J. Annacone to U.S. Nuclear Regulatory Commission, *Request for License Amendments – Addition of Analytical Methodology Topical Report to Technical Specification 5.6.5, "CORE OPERATING LIMITS REPORT (COLR),"* dated April 29, 2010 (ADAMS Accession Number ML101310389)

Ladies and Gentlemen:

By letters dated April 29, 2010 (i.e., References 1 and 2), Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., submitted license amendment requests for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed license amendments would revise Technical Specification 5.6.5.b by adding AREVA Topical Reports ANP-10298PA, *ACE/ATRIUM 10XM Critical Power Correlation*, Revision 0, March 2010 and BAW-10247PA, *Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors*, Revision 0, April 2008, to the list of analytical methods that have been reviewed and approved by the NRC for determining core operating limits.

CP&L is enclosing revised evaluations supporting the determinations that both proposed license amendments involve no significant hazards. The revised evaluations clarify the relationship between the addition of the AREVA analytical methodologies to the Technical Specifications and the use of ATRIUM 10XM fuel.

Progress Energy Carolinas, Inc.
P.O. Box 10429
Southport, NC 28461

T > 910.457.3698

ADD
NR

Document Control Desk
BSEP 10-0083 / Page 2

No regulatory commitments are contained in this letter. Please refer any questions regarding this submittal to Ms. Annette Pope, Supervisor - Licensing/Regulatory Programs, at (910) 457-2184.

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on July 22, 2010.

Sincerely,

A handwritten signature in black ink that reads "Michael J. Annacone" with a stylized flourish at the end.

Michael J. Annacone

WRM/wrm

Enclosures:

1. Revised Evaluation of No Significant Hazards Consideration (TAC Numbers ME2554, ME3555, ME3556, and ME3557)
2. Revised Evaluation of No Significant Hazards Consideration (TAC Numbers ME3558 and ME3559)

Document Control Desk
BSEP 10-0083 / Page 3

cc (with enclosures):

U. S. Nuclear Regulatory Commission, Region II
ATTN: Mr. Luis A. Reyes, Regional Administrator
245 Peachtree Center Ave, NE, Suite 1200
Atlanta, GA 30303-1257

U. S. Nuclear Regulatory Commission
ATTN: Mr. Philip B. O'Bryan, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

U. S. Nuclear Regulatory Commission **(Electronic Copy Only)**
ATTN: Mrs. Farideh E. Saba (Mail Stop OWFN 8G9A)
11555 Rockville Pike
Rockville, MD 20852-2738

Chair - North Carolina Utilities Commission
P.O. Box 29510
Raleigh, NC 27626-0510

Mr. W. Lee Cox, III, Section Chief
Radiation Protection Section
North Carolina Department of Environment and Natural Resources
1645 Mail Service Center
Raleigh, NC 27699-1645

Revised Evaluation of No Significant Hazards Consideration (TAC Numbers ME2554, ME3555, ME3556, and ME3557)

By letter dated April 29, 2010 (i.e., ADAMS Accession Number ML101310388), Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., submitted a license amendment request for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed license amendments would revise Technical Specification 5.6.5.b by adding AREVA Topical Report ANP-10298PA, *ACE/TRIUM 10XM Critical Power Correlation*, Revision 0, March 2010, to the list of analytical methods that have been reviewed and approved by the NRC for determining core operating limits.

Based on discussions with the NRC, a revised evaluation is being provided to clarify the relationship between the addition of the AREVA analytical methodology to the Technical Specifications and the use of TRIUM 10XM fuel. The revised evaluation continues to support the determination that the proposed change involves no significant hazards. The revised evaluation is provided below and supersedes the one provided in CP&L's letter dated April 29, 2010.

5.0 Regulatory Safety Analysis

5.1 No Significant Hazards Consideration

The proposed change will add, to Technical Specification 5.6.5.b, an additional topical report describing an NRC reviewed and approved analytical method for determining core operating limits. The new analytical method, which is described in AREVA Topical Report ANP-10298PA, *ACE/TRIUM 10XM Critical Power Correlation*, Revision 0, March 2010, provides a new correlation for predicting the critical power for boiling water reactors containing TRIUM 10XM fuel.

On March 27, 2008 (i.e., ADAMS Accession Number ML080870478), the NRC issued License Amendments 246 and 274 for BSEP, Units 1 and 2, respectively, revising the Technical Specifications to support use of AREVA fuel and core design methodologies. Incorporation of AREVA Topical Report ANP-10298PA will permit use of a fuel design specific correlation for critical power ratio for the AREVA TRIUM 10XM fuel design. The NRC has previously reviewed and accepted the use of AREVA Topical Report ANP-10298PA for referencing in licensing applications (i.e., ADAMS Accession Number ML100670548). Incorporation of the AREVA Topical Report ANP-10298PA supports the use of the TRIUM 10XM fuel design at BSEP.

CP&L has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The probability of an evaluated accident is derived from the probabilities of the individual precursors to that accident. The proposed amendments add an additional analytical methodology to the list of NRC-approved analytical methods identified in Technical Specification 5.6.5.b that can be used to establish core operating limits. The proposed amendments support the use of the AREVA ATRIUM 10XM fuel design at BSEP. The addition of an approved analytical methodology in Technical Specification Section 5.6.5 has no effect on any accident initiator or precursor previously evaluated and does not change the manner in which the core is operated. The NRC-approved methodology ensures that the output accurately models core behavior. Since no individual precursors of an accident are affected, the proposed amendments do not increase the probability of a previously analyzed event.

The consequences of an evaluated accident are determined by the operability of plant systems designed to mitigate those consequences. The proposed amendments add an additional analytical methodology to the list of NRC-approved analytical methods used to establish core operating limits. The addition of the topical report to Technical Specification 5.6.5.b will allow a new analytical methodology to be used to determine critical power ratio limits. Minimum Critical Power Ratio (MCPR) Safety Limit values, which are defined in Technical Specification 2.1.1.2, are calculated to ensure that greater than 99.9 percent of the fuel rods in the reactor core avoid transition boiling during plant operation, if the safety limit is not exceeded. The derivation of MCPR Safety Limit values in the Technical Specifications, using these NRC-accepted methods, will continue to ensure the MCPR Safety Limit is not exceeded during all modes of plant operation and anticipated operational occurrences. The addition of the analytical methodology described in Topical Report ANP-10298PA to Technical Specification 5.6.5.b does not alter the assumptions of accident analyses or the Technical Specification Bases. Based on the above, the proposed amendments do not increase the consequences of a previously analyzed accident.

Therefore, the proposed amendments do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

Creation of the possibility of a new or different kind of accident requires creating one or more new accident precursors. New accident precursors may be created by modifications of plant configuration, including changes in allowable modes of operation. The proposed

amendments do not involve any plant configuration modifications, do not involve any changes to allowable modes of operation, and do not introduce any new failure mechanisms. The proposed topical report addition to Technical Specification 5.6.5.b provides an analytical methodology for determining core critical power limits that ensures no new accident precursors are created. Therefore, the proposed amendments do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No

The proposed amendments add an additional analytical methodology to the list of NRC-approved analytical methods identified in Technical Specification 5.6.5.b that can be used to establish core operating limits. This addition to Technical Specification 5.6.5.b will allow a new NRC-accepted analytical methodology to be used to determine critical power ratio limits. The MCPR Safety Limit provides a margin of safety by ensuring that at least 99.9 percent of the fuel rods do not experience transition boiling during normal operation and anticipated operational occurrences if the MCPR Safety Limit is not exceeded. The proposed change will ensure the current level of fuel protection is maintained by continuing to ensure that the fuel design safety criterion (i.e., that no more than 0.1 percent of the rods are expected to be in boiling transition if the MCPR Safety Limit is not exceeded) is met.

Therefore, the proposed amendments do not result in a significant reduction in the margin of safety.

Based on the above, CP&L concludes that the proposed amendments present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

Revised Evaluation of No Significant Hazards Consideration (TAC Numbers ME3558 and ME3559)

By letter dated April 29, 2010 (i.e., ADAMS Accession Number ML101310389), Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., submitted a license amendment request for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed license amendments would revise Technical Specification 5.6.5.b by adding AREVA Topical Report BAW-10247PA, *Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors*, Revision 0, April 2008, to the list of analytical methods that have been reviewed and approved by the NRC for determining core operating limits.

Based on discussions with the NRC, a revised evaluation is being provided to clarify the relationship between the addition of the AREVA analytical methodology to the Technical Specifications and the use of ATRIUM 10XM fuel. The revised evaluation continues to support the determination that the proposed change involves no significant hazards. The revised evaluation is provided below and supersedes the one provided in CP&L's letter dated April 29, 2010.

5.0 Regulatory Safety Analysis

5.1 No Significant Hazards Consideration

The proposed change will add, to Technical Specification 5.6.5.b, an additional topical report describing an NRC reviewed and approved analytical method for determining core operating limits. The new analytical method, which is described in AREVA Topical Report BAW-10247PA, *Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors*, Revision 0, April 2008, provides a new statistical thermal-mechanical evaluation methodology for determining reactor core linear heat generation limits in boiling water reactors.

On March 27, 2008 (i.e., ADAMS Accession Number ML080870478), the NRC issued License Amendments 246 and 274 for BSEP, Units 1 and 2, respectively, revising the Technical Specifications to support use of AREVA fuel and core design methodologies. The NRC has previously reviewed and accepted the use of AREVA Topical Report BAW-10247PA for referencing in licensing applications (i.e., ADAMS Accession Number ML080350138). Incorporation of AREVA Topical Report BAW-10247PA will permit use of a new statistical thermal-mechanical evaluation methodology for determining reactor core linear heat generation limits for both the currently used AREVA ATRIUM-10 fuel design as well as support future use of the AREVA ATRIUM 10XM fuel design at BSEP.

CP&L has evaluated whether or not a significant hazards consideration is involved with the proposed amendments by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The probability of an evaluated accident is derived from the probabilities of the individual precursors to that accident. The proposed amendments add an additional analytical methodology to the list of NRC-approved analytical methods identified in Technical Specification 5.6.5.b that can be used to establish core operating limits. The proposed amendments support the use of the AREVA ATRIUM 10XM fuel design at BSEP. The addition of an approved analytical methodology in Technical Specification Section 5.6.5 has no effect on any accident initiator or precursor previously evaluated and does not change the manner in which the core is operated. The NRC-approved methodology ensures that the output accurately models core behavior. Since no individual precursors of an accident are affected, the proposed amendments do not increase the probability of a previously analyzed event.

The consequences of an evaluated accident are determined by the operability of plant systems designed to mitigate those consequences. The proposed amendments add an additional analytical methodology to the list of NRC-approved analytical methods used to establish core operating limits. The addition of the topical report to Technical Specification 5.6.5.b will allow a new thermal-mechanical methodology, based on the RODEX4 fuel performance code, to be used to determine reactor core linear heat generation rate limits monitored as specified by Technical Specification 3.2.3. The addition of the analytical methodology described in Topical Report BAW-10247PA to Technical Specification 5.6.5.b does not alter the assumptions of accident analyses or the Technical Specification Bases. Based on the above, the proposed amendments do not increase the consequences of a previously analyzed accident.

Therefore, the proposed amendments do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

Creation of the possibility of a new or different kind of accident requires creating one or more new accident precursors. New accident precursors may be created by modifications of plant configuration, including changes in allowable modes of operation. The proposed amendments do not involve any plant configuration modifications, do not involve any changes to allowable modes of operation, and do not introduce any new failure mechanisms. The proposed topical report addition to Technical Specification 5.6.5.b provides an analytical methodology for determining reactor core linear heat generation rate limits that ensures no new accident precursors are created. Therefore, the proposed

amendments do not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No

The proposed amendments add an additional analytical methodology to the list of NRC-approved analytical methods identified in Technical Specification 5.6.5.b that can be used to establish core operating limits. This addition to Technical Specification 5.6.5.b will allow a new NRC-accepted analytical methodology to be used to determine reactor core linear heat generation rate limits.

Limits on the linear heat generation rate are specified to ensure that fuel design limits are not exceeded anywhere in the core during normal operation, including anticipated operational occurrences. Exceeding the linear heat generation rate limit could potentially result in fuel damage and subsequent release of radioactive materials. The mechanisms that could cause fuel damage during normal operations and operational transients and that are considered in fuel evaluations are rupture of the fuel rod cladding caused by strain and overheating of the fuel. The proposed change will ensure the current level of fuel protection is maintained (i.e., that the fuel design safety criteria of less than one percent plastic strain of the fuel cladding is met and incipient centerline melting of the fuel does not occur) and thus assure that rupture of the fuel rod cladding caused by strain and overheating of the fuel does not occur.

Therefore, the proposed amendments do not result in a significant reduction in the margin of safety.

Based on the above, CP&L concludes that the proposed amendments present no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.