



# Progress Energy

Michael J. Annacone  
Vice President  
Brunswick Nuclear Plant

March 16, 2011

SERIAL: BSEP 11-0031  
TSC-2010-02

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  
Response to Request for Additional Information Regarding License  
Amendment Request for Addition of Analytical Methodology Topical  
Reports to Technical Specification 5.6.5 (NRC TAC Nos. ME3858  
and ME3859)

Reference: Letter from Michael J. Annacone to the U.S. Nuclear Regulatory  
Commission (Serial: BSEP 10-0057), "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 letter dated April 29, 2010, Carolina Power & Light Company (CP&L), now doing  
business as Progress Energy Carolinas, Inc., requested a license amendment to revise the  
Technical Specifications (TS) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1  
and 2. The proposed license amendment revises Technical Specification 5.6.5.b by adding  
AREVA 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.

On March 9, 2011, via electronic mail, the NRC provided a request for additional  
information (RAI) regarding the April 29, 2010, license amendment request (i.e., non-  
public ADAMS Accession Number ML110700352). The response to the RAI is provided  
in Enclosure 1. The RAI and Enclosure 3 (i.e., AREVA Report ANP-2992P, Revision 0,  
*AREVA Response to Additional RAI on the Brunswick RODEX4 LAR*), which supports the  
Enclosure 1 response, contain information that AREVA considers proprietary, as defined  
by 10 CFR 2.390. AREVA, as the owner of that proprietary information, has executed the  
affidavit provided in Enclosure 2 and stated that the identified proprietary information has  
been handled and classified as proprietary, is customarily held in confidence, and has been  
withheld from public disclosure. AREVA requests that the identified proprietary  
information be withheld from public disclosure in accordance with the provisions of

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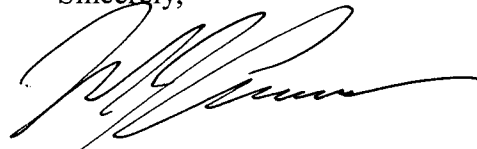
10 CFR 2.390. A non-proprietary version of ANP-2992P, Revision 0, (i.e., ANP-2992NP, Revision 0) is provided in Enclosure 4.

Regulatory commitments contained in this submittal are provided in Enclosure 5.

Please refer any questions regarding this submittal to Mr. Lee Grzeck, Acting Supervisor - Licensing/Regulatory Programs, at (910) 457-2487.

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on March 16, 2011.

Sincerely,

A handwritten signature in black ink, appearing to read 'Michael J. Annacone', written in a cursive style.

Michael J. Annacone

WRM/wrm

Enclosures:

1. Response to March 9, 2011, NRC Request for Additional Information
2. AREVA Affidavit Regarding Withholding ANP-2992P, Revision 0, from Public Disclosure
3. AREVA Report ANP-2992P, Revision 0, *AREVA Response to Additional RAI on the Brunswick RODEX4 LAR*  
**(Proprietary Information – Withhold from Public Disclosure in Accordance With 10 CFR 2.390)**
4. AREVA Report ANP-2992NP, Revision 0, *AREVA Response to Additional RAI on the Brunswick RODEX4 LAR*
5. List of Regulatory Commitments

cc (with Enclosures 1, 2, 3, 4, and 5):

U. S. Nuclear Regulatory Commission, Region II  
ATTN: Mr. Victor M. McCree, 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

cc (with Enclosures 1, 2, 4 and 5 only):

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

Response to March 9, 2011, NRC Request for Additional Information

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., requested a license amendment to revise the Technical Specifications (TS) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed license amendment revises Technical Specification 5.6.5.b by adding AREVA 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.

On March 9, 2011, via electronic mail, the NRC provided a request for additional information (RAI) concerning the above referenced license amendment request (i.e., non-public ADAMS Accession Number ML110700352). The proprietary RAI is contained in its entirety in Enclosure 3. The non-proprietary RAI and CP&L's non-proprietary response follow.

NRC Request for Additional Information:

Localized cladding defects (e.g. spallation, hydride blisters) could significantly impact fuel rod stress and strain calculations and ultimately the ability to accurately predict cladding failure. In responding to the Nuclear Regulatory Commission (NRC) staff's RAI, the licensee indicated that [[ ]] were observed at [[ ]] microns oxidation level. Additionally, the NRC staff determined that there is not adequate justification within the licensee's application for demonstrating that cladding strain would meet the specified acceptable fuel design limits (SAFDL) in Appendix A to 10 CFR 50 with the amount of hydrogen at the oxidation limit of [[ ]] microns for ATRIUM 10XM. The NRC staff has determined that the licensee needs to establish (1) an upper bound on cladding oxide thickness corresponding to [[ ]]

]] and (2) an upper bound on cladding hydrogen content corresponding to the fuel rod cladding strain SAFDL assumed in the AOO overpower analyses.

Please provide to the NRC staff how the licensee will define and document these limits, the basis for the limits, and what processes the licensee will use to comply with these limits.

Response:

Enclosure 3 defines, documents, and describes the basis for additional cladding peak oxide thickness and cladding hydrogen content upper bound limits, recently deemed necessary by the NRC staff subsequent to the generic staff approval of AREVA Topical Report BAW-10247PA, *Realistic Thermal-Mechanical Fuel Rod Methodology for Boiling Water Reactors*, Revision 0, April 2008, hereafter referred to as RODEX4 in this response. The additional Enclosure 3 limits are specific to CP&L's use of the RODEX4 methodology to determine BSEP core operating limits.

An upper bound analytical limit on cladding peak oxidation corresponding to the onset of spallation, with the potential consequence of hydride localization beneath spalled off areas, is defined by Enclosure 3. This cladding peak oxide limit also accounts for nodular corrosion, as described in Enclosure 3. Cladding peak oxide will be calculated in accordance with the NRC-approved RODEX4 corrosion model and maintained within the proprietary analytical peak oxide limit specified by Enclosure 3 when RODEX4 is used to determine BSEP core operating limits. This cladding peak oxide limit will be used in lieu of the existing NRC-approved RODEX4 cladding oxide thickness limit described in BAW-10247PA.

As part of the confirmatory analyses supporting CP&L's license amendment request to add RODEX4 to the list of approved methodologies listed in Brunswick Technical Specification 5.6.5.b, the maximum cladding oxide thickness of ATRIUM 10XM fuel discharged from an equilibrium BSEP fuel cycle was projected using the RODEX4 corrosion model. The proprietary result is presented in Table 3-2 of ANP-2950P, *ATRIUM 10XM Fuel Rod Thermal and Mechanical Evaluation for Brunswick Unit 2 Cycle 20 Reload BRK2-20*, previously provided to the NRC by CP&L's letter dated October 12, 2010 (i.e., ADAMS Accession Number ML102920550). This result demonstrates operation of AREVA fuel in BSEP is not expected to exceed the upper bound analytical limit on cladding peak oxidation corresponding to the onset of spallation, as defined and supported by Enclosure 3. The preceding conclusion is applicable to both the ATRIUM 10XM and existing, co-resident ATRIUM-10 fuel, because both fuel designs use the same fuel cladding material. For this reason, no significant difference in fuel cladding oxidation performance is expected between the ATRIUM 10XM and the ATRIUM-10 fuel designs.

An upper bound limit on cladding hydrogen content corresponding to the fuel rod cladding strain SAFDL assumed in the abnormal operational occurrence (AOO) overpower analyses is defined by Enclosure 3. Enclosure 3 also demonstrates this hydrogen content limit will not be exceeded within the NRC-approved RODEX4 fuel exposure range of applicability. Because RODEX4 will not be used to determine core operating limits outside its approved range of applicability, no other process or NRC-approved hydrogen pick-up model is required to comply with the Enclosure 3 hydrogen content limit.

AREVA Affidavit Regarding Withholding  
ANP-2992P, Revision 0, from Public Disclosure

AFFIDAVIT

STATE OF WASHINGTON )  
 ) ss.  
COUNTY OF BENTON )

1. My name is Alan B. Meginnis. I am Manager, Product Licensing, for AREVA NP Inc. and as such I am authorized to execute this Affidavit.

2. I am familiar with the criteria applied by AREVA NP to determine whether certain AREVA NP information is proprietary. I am familiar with the policies established by AREVA NP to ensure the proper application of these criteria.

3. I am familiar with the AREVA NP information contained in the report ANP-2992P Revision 0, entitled, "AREVA Response to Additional RAI on the Brunswick RODEX4 LAR," dated March 2011 and referred to herein as "Document." Information contained in this Document has been classified by AREVA NP as proprietary in accordance with the policies established by AREVA NP for the control and protection of proprietary and confidential information.

4. This Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by AREVA NP and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in this Document as proprietary and confidential.

5. This Document has been made available to the U.S. Nuclear Regulatory Commission in confidence with the request that the information contained in this Document be withheld from public disclosure. The request for withholding of proprietary information is made in accordance with 10 CFR 2.390. The information for which withholding from disclosure is

requested qualifies under 10 CFR 2.390(a)(4) "Trade secrets and commercial or financial information."

6. The following criteria are customarily applied by AREVA NP to determine whether information should be classified as proprietary:

- (a) The information reveals details of AREVA NP's research and development plans and programs or their results.
- (b) Use of the information by a competitor would permit the competitor to significantly reduce its expenditures, in time or resources, to design, produce, or market a similar product or service.
- (c) The information includes test data or analytical techniques concerning a process, methodology, or component, the application of which results in a competitive advantage for AREVA NP.
- (d) The information reveals certain distinguishing aspects of a process, methodology, or component, the exclusive use of which provides a competitive advantage for AREVA NP in product optimization or marketability.
- (e) The information is vital to a competitive advantage held by AREVA NP, would be helpful to competitors to AREVA NP, and would likely cause substantial harm to the competitive position of AREVA NP.

The information in the Document is considered proprietary for the reasons set forth in paragraphs 6(b), 6(d) and 6(e) above.

7. In accordance with AREVA NP's policies governing the protection and control of information, proprietary information contained in this Document have been made available, on a limited basis, to others outside AREVA NP only as required and under suitable agreement providing for nondisclosure and limited use of the information.

8. AREVA NP policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.



9. The foregoing statements are true and correct to the best of my knowledge, information, and belief.

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SUBSCRIBED before me this 15<sup>th</sup>  
day of March, 2011.

Mary Anne Heilman

Mary A Heilman  
NOTARY PUBLIC, STATE OF WASHINGTON  
MY COMMISSION EXPIRES: 6/9/12

