Progress Energy

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FEB 14 2008

SERIAL: BSEP 08-0023
TSC-2006-06

10 CFR 50.90

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

Subject: Brunswick Steam Electric Plant, Unit Nos. 1 and 2
Docket Nos. 50-325 and 50-324/License Nos. DPR-71 and DPR-62
Additional Information in Support of Request for License Amendments Regarding Linear Heat Generation Rate and Core Operating Limits Report References for AREVA NP Fuel (NRC TAC Nos. MD4063 and MD4064)

References:

1. Letter from James Scarola to the U.S. Nuclear Regulatory Commission (Serial: BSEP 06-0129), "Request for License Amendments Regarding Linear Heat Generation Rate and Core Operating Limits Report References for AREVA NP Fuel," dated January 22, 2007 (ADAMS Accession Number ML070300570)
2. Letter from James Scarola to the U.S. Nuclear Regulatory Commission (Serial: BSEP 07-0053), "Additional Information in Support of Request for License Amendment Regarding Linear Heat Generation Rate and Core Operating Limits Report References for AREVA NP Fuel," dated June 21, 2007 (ADAMS Accession Number ML071840214)
3. Letter from Ben Waldrep to the U.S. Nuclear Regulatory Commission (Serial: BSEP 07-0067), "Additional Information in Support of Request for License Amendment Regarding Linear Heat Generation Rate and Core Operating Limits Report References for AREVA NP Fuel," dated July 18, 2007 (ADAMS Accession Number ML072070305)
4. Letter from James Scarola to the U.S. Nuclear Regulatory Commission (Serial: BSEP 07-0108), "Additional Information in Support of Request for License Amendments Regarding Linear Heat Generation Rate and Core Operating Limits Report References for AREVA NP Fuel," dated October 15, 2007 (ADAMS Accession Number ML072950366)

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5. Letter from Benjamin C. Waldrep to the U.S. Nuclear Regulatory Commission (Serial: BSEP 08-0009), "Additional Information in Support of Request for License Amendments Regarding Linear Heat Generation Rate and Core Operating Limits Report References for AREVA NP Fuel," dated January 24, 2008 (ADAMS Accession Number ML080310843)

Ladies and Gentlemen:

By letter dated January 22, 2007, as supplemented by letters dated June 21, 2007, July 18, 2007, October 15, 2007, and January 24, 2008, Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., requested license amendments to revise the Technical Specifications (TS) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed changes are being made to support the BSEP transition to AREVA manufactured fuel assemblies.

On November 28, 2007, and January 7, 2008, via electronic mail, the NRC requested additional information regarding the changes being proposed. CP&L provided this information by the letter dated January 24, 2008. On January 31, 2008, during a telephone conference, the NRC requested additional information regarding Response 2 in CP&L's letter dated January 24, 2008. The requested information, which is provided in Enclosure 1, includes information that AREVA considers to be proprietary, as defined in 10 CFR 2.390. AREVA, as the owner of the proprietary information, has executed the affidavit provided in Enclosure 2, which identifies that the enclosed 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 enclosed proprietary information be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390. A non-proprietary version of the response is provided in Enclosure 3.

There are no regulatory commitments associated with this submittal. Please refer any questions regarding this submittal to Mr. Randy C. Ivey, Manager - Support Services, at (910) 457-2447.

I declare, under penalty of perjury, that the foregoing is true and correct. Executed on February 14, 2008.

Sincerely,

Benjamin C. Waldrep

WRM/wrm

Enclosures:

1. Response to January 31, 2008, NRC Request for Information **(Proprietary Information – Withhold from Public Disclosure in Accordance With 10 CFR 2.390)**
2. AREVA Affidavit Regarding Withholding Proprietary Information from Public Disclosure
3. Response to January 31, 2008, NRC Request for Information (Non-Proprietary Version)

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

U. S. Nuclear Regulatory Commission, Region II
ATTN: Mr. Victor M. McCree, Regional Administrator (Acting)
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, GA 30303-8931

U. S. Nuclear Regulatory Commission
ATTN: Mr. Joseph D. Austin, NRC Senior Resident Inspector
8470 River Road
Southport, NC 28461-8869

U. S. Nuclear Regulatory Commission **(Electronic Copy Only)**
ATTN: Mr. Stewart N. Bailey (Mail Stop OWFN 8B1)
11555 Rockville Pike
Rockville, MD 20852-2738

cc (with Enclosures 2 and 3):

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

Ms. Beverly O. Hall, Section Chief
Radiation Protection Section, Division of Environmental Health
North Carolina Department of Environment and Natural Resources
3825 Barrett Drive
Raleigh, NC 27609-7221

AREVA Affidavit Regarding Withholding Proprietary Information from Public Disclosure

AFFIDAVIT

COMMONWEALTH OF VIRGINIA)
) ss.
CITY OF LYNCHBURG)

1. My name is Gayle F. Elliott. I am Manager, Product Licensing, for AREVA NP Inc. (AREVA NP) 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 attachment to Progress Energy letter BSEP 08-0023 with subject entitled "Additional Information in Support of Request for License Amendments Regarding Linear Heat Generation Rate and Core Operating Limits Report," dated February 14, 2008 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) and 6(c) 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.

SUBSCRIBED before me this 14th day of February, 2008.

Sherry L. McFaden
NOTARY PUBLIC, COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES: 10/31/10
Reg. # 7079129

SHERRY L. MCFADEN
Notary Public
Commonwealth of Virginia
7079129
My Commission Expires Oct 31, 2010

Response to January 31, 2008, NRC Request for Information
(Non-Proprietary Version)

Response to January 31, 2008, NRC Request for Information

By letter dated January 22, 2007, as supplemented by letters dated June 21, 2007, July 18, 2007, October 15, 2007, and January 24, 2008, Carolina Power & Light Company (CP&L), now doing business as Progress Energy Carolinas, Inc., requested license amendments to revise the Technical Specifications (TS) for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2. The proposed changes are being made to support the BSEP transition to AREVA manufactured fuel assemblies.

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NRC Question 12

Present the database used to establish the BSEP specific radial bundle power uncertainty versus core power level, core power to flow ratio, and core void fraction.

Response

The Reference 1 methodology calculates radial bundle power uncertainty (δP^n_{ij}) from separately determined component uncertainties. The three plant specific component uncertainties used to calculate δP^n_{ij} constitute the database used to establish the BSEP specific δP^n_{ij}. They are:

- the deviation between the CASMO-4/MICROBURN-B2 (C4/MB2) calculated radial traversing incore probe (TIP) response and the measured radial TIP response ($\delta T'_{ij}$),
- radial TIP measurement uncertainty (δT^m_{ij}), and
- radial synthesis uncertainty (δS_{ij}).

These plant specific uncertainties are determined using TIP measurements, which are taken at or near full power conditions for Local Power Range Monitor (LPRM) calibration.

The BSEP specific value of $\delta T'_{ij}$ was calculated in accordance with the Reference 1 methodology using BSEP gamma TIP measurements and is [[_____]]. BSEP is a D-Lattice plant. For comparison, Reference 1 reports a $\delta T'_{ij}$ of [[_____]] for D-Lattice plants.

The BSEP specific $\delta T'_{ij}$ database is shown versus core power in Figure 1, versus core power-to-flow ratio in Figure 2, and versus core void fraction in Figure 3. Each figure presents the same data. The database includes 73 full core gamma TIP measurements: 43 spanning Unit 1 Cycles 14, 15, and 16 (i.e., through August 2006), and 30 spanning Unit 2 Cycles 16 and 17 (i.e., to October 2006).

Figures 1 through 3 also show gamma TIP measurements taken prior to NRC approval of BSEP Extended Power Uprate (EPU) operation spanning Unit 1 Cycle 13 (i.e., 17 measurements) and Unit 2 Cycle 15 (i.e., 19 measurements), as well as 15 gamma TIP measurements taken at EPU conditions after analysis of the BSEP database was complete. This additional data was not used to determine BSEP specific uncertainties and is provided for information only.

Figures 1 through 3 clearly demonstrate that the D-Lattice radial bundle power uncertainty reported in the Reference 1 topical report is very conservative for BSEP. Figures 1 through 3 also clearly demonstrate there is no correlation between the BSEP specific uncertainty and operation at EPU conditions, core power to flow ratio, or core void fraction.

BSEP safety limit minimum critical power ratio analyses are based on the radial bundle power uncertainty value of [[_____]] reported in the topical report rather than the BSEP specific value of [[_____]]. The BSEP specific value is conservative relative to the topical report value by [[_____]] due primarily to BSEP implementation of gamma TIPs for LPRM calibration. As discussed in Appendix C.2 of Reference 2, both the BSEP specific and topical report bundle power uncertainties are additionally very conservative relative to their respective TIP measurement databases due to the use of a correlation coefficient to increase calculated power uncertainty above calculated TIP uncertainty, contrary to measured data that support decreasing calculated power uncertainty below calculated TIP uncertainty.

The BSEP specific radial TIP measurement uncertainty (δT^m_{ij}) was calculated in accordance with the Reference 1 methodology using BSEP gamma TIP measurements and is [[_____]]. For comparison, Reference 1 reports a δT^m_{ij} of [[_____]] for D-Lattice plants. δT^m_{ij} is comprised of random instrument error and geometric measurement uncertainty caused by variations in the physical TIP location. The BSEP gamma TIP system is far less sensitive than neutron TIP systems to variations in TIP location within

the corner water gap between fuel assemblies. Because δT^m_{ij} is determined by comparing TIP measurements in symmetrically operated core locations, it is independent of the C4/MB2 core model and core operating conditions.

The BSEP specific radial synthesis uncertainty (δS_{ij}) was calculated in accordance with the Reference 1 methodology using BSEP gamma TIP measurements and is [[_____]]. For comparison, Reference 1 reports a δS_{ij} of [[_____]] for D-Lattice plants. δS_{ij} is the uncertainty associated with update of calculated power by the Core Monitoring System to more closely match in-core instrumentation. δS_{ij} is a function of the Core Monitoring System update algorithm, which is independent of core operating conditions, [[

_____]] a comparison of δS_{ij} to core operating conditions is not provided.

NRC Question 13

Discuss the applicability of the BSEP TIP measurement database to ATRIUM™-10 fuel.

Response

The BSEP gamma TIP measurement database and uncertainties derived from it are applicable to ATRIUM™-10 fuel because both the BSEP database and the Reference 1 topical report database show changes in fuel design have no significant impact on C4/MB2 uncertainties.

Figures 1 through 3 demonstrate there is no significant uncertainty variation in the BSEP gamma TIP measurement database. These measurements include a full 9x9 GE13 core operated in Unit 1 Cycle 13, mixed GE13 and GE14 cores operated in Unit 1 Cycles 14 and 15 and Unit 2 Cycles 15 and 16, and full 10x10 GE14 cores operated in Unit 1 Cycle 16 and Unit 2 Cycles 17 and 18.

The Reference 1 topical report database includes TIP measurements of cores containing many different fuel designs and identifies no correlation between C4/MB2 uncertainty and fuel design. C4/MB2 error compared to bundle gamma scan data reported in Tables 8.3, 8.4, and 8.5 of Reference 1 for 10x10 and other orthogonal lattice designs shows there is no degradation for 10x10 fuel relative to the other designs.

References

1. EMF-2158(P)(A) Revision 0, "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2," Siemens Power Corporation, October 1999.
2. ANP-2638(P) Revision 0, "Applicability of AREVA NP BWR Methods to Extended Power Uprate Conditions," AREVA NP, July 2007.

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Figure 1: BSEP $\delta T'_{ij}$ Gamma TIP Database Versus Core Power

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Figure 2: BSEP $\delta T'_{ij}$ Gamma TIP Database Versus Power/Flow

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Figure 3: BSEP $\delta T'_{ij}$ Gamma TIP Database Versus Core Void Fraction