Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

June 3, 2008

TVA-BFN-TS-418

10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop OWFN, P1-35
Washington, D. C. 20555-0001

Gentlemen:

In the Matter of	)	Docket Nos. 50-260
Tennessee Valley Authority	)	50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 2 AND 3 - TECHNICAL SPECIFICATIONS (TS) CHANGE TS-418 - EXTENDED POWER UPRATE (EPU) - SUPPLEMENTAL RESPONSE TO ROUND 16 REQUEST FOR ADDITIONAL INFORMATION (RAI) - SRXB-88 (TAC NOS. MD5263 AND MD5264)

By letter dated June 25, 2004 (ADAMS Accession No. ML041840301), TVA submitted a license amendment application to the NRC for EPU operation of BFN Units 2 and 3. The pending EPU amendment increases the maximum authorized power level by approximately 14 percent from 3458 megawatts thermal (MWt) to 3952 MWt.

On February 29, 2008, the NRC staff issued a Round 16 RAI (ML080350698) regarding the BFN EPU license amendment requests. A response to Round 16 RAI questions SRXB-74/86 and SRXB-87 through SRXB-90 was submitted on March 6, 2008 (ML080710498). Teleconferences between TVA and NRC were subsequently held on March 14, March 31, and April 4, 2008, regarding TVA's responses to Round 16 RAI questions SRXB-87, SRXB-88, and SRXB-89. As a result of these teleconferences, TVA agreed to submit supplemental responses to these three RAIs.

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NRR

A supplemental response to SRXB-87 and SRXB-89 was submitted on May 1, 2008 (ML081280627).

Enclosure 1 to this letter provides the supplemental response to the remaining item, SRXB-88. The original March 6, 2008, TVA response to SRXB-88 is also included for NRC's convenience.

Enclosure 1 is a proprietary response to RAI SRXB-88 and contains information that AREVA NP, Inc. (AREVA) considers to be proprietary in nature and subsequently, pursuant to 10 CFR 9.17(a)(4), 2.390(a)(4) and 2.390(d)(1), AREVA requests that such information be withheld from public disclosure. Enclosure 2 is a redacted version of Enclosure 1 with the proprietary material removed and is suitable for public disclosure. Enclosure 3 contains an affidavit from AREVA supporting this request for withholding from public disclosure.

TVA has determined that the additional information provided by this letter does not affect the no significant hazards considerations associated with the proposed TS changes. The proposed TS changes still qualify for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9).

No new regulatory commitments are made in this submittal. If you have any questions regarding this letter, please contact me at (256)729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 3rd day of June, 2008.

Sincerely,

D. T. Langley
Manager of Licensing
and Industry Affairs

Enclosures:
1. Supplemental Response to Round 16 Request for Additional Information SRXB-88 (Proprietary Information Version)
2. Supplemental Response to Round 16 Request for Additional Information SRXB-88 (Non-proprietary Information Version)
3. Affidavit

Enclosures:
cc (w. Enclosures):
State Health Officer
Alabama State Department of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, Alabama 36130-3017

NRC Senior Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, AL 35611-6970

Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

Eva Brown, Project Manager
U.S. Nuclear Regulatory Commission
(MS 08G9)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

NON-PROPRIETARY INFORMATION

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 AND 3

TECHNICAL SPECIFICATIONS (TS) CHANGES TS-418
EXTENDED POWER UPRATE (EPU)

SUPPLEMENTAL RESPONSE TO ROUND 16
REQUEST FOR ADDITIONAL INFORMATION SRXB-88

(NON-PROPRIETARY INFORMATION VERSION)

This enclosure provides TVA's supplemental response to NRC's February 29, 2008, Round 16 Request for Additional Information (RAI)(ADAMS Accession No. ML080350698) item SRXB-88.

NRC RAI SRXB-88 (Units 2 and 3 only)

To address the adequacy of void-quality correlation bias and uncertainties, the staff understands that a plant specific calculation can be performed to assess the impact of the uncertainties on the operating limit minimum critical power ratio (OLMCPR). Provide the following additional information:

a. Discuss how the void-quality correlation bias and uncertainties are addressed for the projected Units 2 and 3 operation at EPU conditions.

b. Determine the net impact on the OLMCPR from a bias in the void-quality correlation within the uncertainty range based on full-scale-test data.

March 6, 2008 TVA Response to SRXB-88 (Units 2 and 3 only)

a. The AREVA analysis methods and the correlations used by the methods are applicable for both pre-EPU and EPU conditions as discussed in responses to previous BFN Unit 2/3 RAIs (SRXB-A.15, SRXB-A.26 through SRXB-A.29, SRXB-A.35), which were submitted to NRC by TVA on March 7, 2006 (ML060680583). The approach for addressing void-quality correlation bias and uncertainty remains unchanged and is applicable for BFN EPU operation. The approach for addressing void-quality correlation bias and uncertainty is described below.

   The [ ] void-quality correlation has been qualified by AREVA against both the FRIGG void measurements and ATRIUM-10 measurements. Despite the different geometrical configurations between FRIGG and ATRIUM-10, the [ ] correlation compares very well to the measured data as illustrated in Figure SRXB-88.1.

   The OLMCPR is determined based on the SLMCPR methodology and the transient analysis (ΔCPR) methodology. Void-quality correlation uncertainty is not a direct input to either of these methodologies; however, the impact of void-correlation uncertainty is inherently incorporated in both methodologies as discussed below.

   The SLMCPR methodology explicitly considers important uncertainties in the Monte Carlo calculations performed to determine the number of rods in boiling transition. One of the uncertainties considered in the SLMCPR methodology is the bundle power uncertainty. This uncertainty is determined

through comparison of calculated to measured core power distributions. Any miscalculation of void conditions will increase the error between the calculated and measured power distributions and be reflected in the bundle power uncertainty. Therefore, void-quality correlation uncertainty is an inherent component of the bundle power uncertainty used in the SLMCPR methodology.

The transient analysis methodology is not a statistical methodology and uncertainties are not directly input to the analyses. The transient analysis methodology is a deterministic, bounding approach that contains sufficient conservatism to offset uncertainties in individual phenomena. Conservatism is incorporated in the methodology in two ways: (1) computer code models are developed to produce conservative results on an integral basis relative to benchmark tests, and (2) important input parameters are biased in a conservative direction in licensing calculations.

The transient analysis methodology results in predicted power increases that are bounding relative to benchmark tests. In addition, for licensing calculations a 110% multiplier is applied to the calculated integral power to provide additional conservatism to offset uncertainties in the transient analysis methodology. Therefore, uncertainty in the void-quality correlation is inherently incorporated in the transient analysis methodology.

Based on the above discussions, the impact of void-quality correlation uncertainty is inherently incorporated in the analytical methods used to determine the OLMCPR. Biasing of important input parameters in licensing calculations provides additional conservatism in establishing the OLMCPR. No additional adjustments to the OLMCPR are required to address void-quality correlation uncertainty.

b. A sensitivity calculation was previously performed for another plant to assess the impact of a bias in the void-quality correlation on the OLMCPR. The sensitivity calculation used an alternate void-quality correlation (Ohkawa-Lahey) that results in the prediction of lower void fractions than the [ ] correlation. The Ohkawa-Lahey predicted exit void fraction data is closer to the low end of the measured data (~ 2% to 3% bias relative to [ ]). These sensitivity calculations demonstrated that the void-quality correlation bias had small

and offsetting impacts on SLMCPR and ΔCPR; there was no impact on the OLMCPR.

A BFN plant specific calculation was performed for a proposed EPU core design for Unit 3 Cycle 14 with the Ohkawa-Lahey alternate void-quality correlation. The BFN calculation demonstrated that the change in the SLMCPR (0.0017) and in the ΔCPR (0.0001) were small and did not impact the OLMCPR.

Figure SRXB-88.1 Void Fraction Correlation Comparison to FRIGG and ATRIUM-10 Test Data

TVA Supplemental Response to SRXB-88 (Units 2 and 3 only)

Upon further discussions with the NRC, two studies were proposed to further assess the void-quality correlation. The first study propagated a change in the void-quality correlation to the calculation of the OLMCPR. The second study assessed the impact of only a change in the void reactivity coefficient in the transient response.

For the first study, the transient ΔCPR was determined from a combination of three main computer codes: MICROBURN-B2, COTRANSA2, and XCOBRA-T.

The [ ] correlation in MICROBURN-B2 was modified to correct the mean to match the measured ATRIUM-10 void fraction data. The modified [ ] correlation parameters were then modified to generate two bounding correlations for the ATRIUM-10 of ±0.05 void. The results of this modified correlation are presented in Figure SRXB-88.2.

COTRANSA2 does not have the [ ] correlation. To avoid additional time needed to incorporate the [ ] correlation or modify the Ohkawa-Lahey correlation, the modified [ ] correlations in MICROBURN-B2 were approximated in COTRANSA2 with [

].

Figure SRXB-88.3 shows a comparison of the [ ] ratio results compared to the ATRIUM-10 test data. This approach created equivalent void fractions as the [ ] correlation modifications.

Like COTRANSA2, XCOBRA-T does not have the [ ] correlation. Unlike COTRANSA2, XCOBRA-T does not have [

]. For the other void scenarios, no correction was done in XCOBRA-T. Not modifying the void-quality correlation for the other void scenarios results in a very small difference in ΔCPR.

The transient response was assessed with a BFN plant specific calculation performed for a proposed EPU core design for Unit 3 Cycle 14. The impact of the change in the void correlations was also captured in the burn history of the fuel. The SLMCPR response was also assessed with the new input corresponding to the three different void scenarios. The results are provided in Table SRXB-88.1.

The second study assessed the impact of only a change in the void reactivity coefficient by increasing [ ] in COTRANSA2 by the ratio of the void reactivities (+0.05 Case/Reference Case) computed by MICROBURN-B2. The result is also provided in Table SRXB-88.1.

As seen in the results, modifying the void-quality correlations to correct the mean to match the measured ATRIUM-10 void fraction data results in a very small increase in ΔCPR, a very small decrease in SLMCPR, and a very small increase in OLMCPR for this study; therefore, the impact of the correlation bias is insignificant.

The +0.05 void scenarios show an increase in the OLMCPR; however, as mentioned previously, the transient analysis methodology is a deterministic, bounding approach that contains sufficient conservatism to offset uncertainties in individual phenomena. Conservatism is incorporated in the models to bound results on an integral basis relative to benchmark tests. For licensing calculations, important input parameters are biased in a conservative direction. In addition, the licensing calculations include a 110% multiplier to the calculated integral power to provide additional conservatism to offset uncertainties in the transient analysis methodology (which includes the void-quality correlation). Even with an extreme bias in the void correlation of +0.05, the conservatism introduced by the 110% multiplier is alone sufficient to offset the increase in results in the first study. The conservatism of the 110% multiplier was [ ]. These calculations demonstrate that the overall methodology has sufficient conservatism to account for both the bias and the uncertainty in the void-quality correlation.

Table SRXB-88.1 Void Sensitivity Results

Parameter	Reference Calculation	Study 1 Modified V-Q (0.0)	Study 1 Modified V-Q (+0.05)	Study 1 Modified V-Q (-0.05)	Study 2 Modified V-Q (+0.05)
ΔCPR	0.305	0.307	0.321	0.305	0.332
SLMCPR	1.09	1.09	1.09	1.09	1.09
ΔSLMCPR	NA	-0.001	-0.002	+0.002	0.000
OLMCPR	1.395	1.396	1.409	1.397	1.422

Figure SRXB-88.2 Modified Void Fraction Correlation Comparison to ATRIUM-10 Test Data

Figure SRXB-88.3 [ ] Void Fraction Results
Comparison to ATRIUM-10 Test Data

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 AND 3

TECHNICAL SPECIFICATIONS (TS) CHANGES TS-418
EXTENDED POWER UPRATE (EPU)

SUPPLEMENTAL RESPONSE TO ROUND 16
REQUEST FOR ADDITIONAL INFORMATION SRXB-88

AFFIDAVIT

This enclosure provides AREVA's affidavit for Enclosure 1.

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 Responses to NRC RAI for Round 16 for Browns Ferry EPU, SRXB-88 with Supplemental Information, dated May 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.

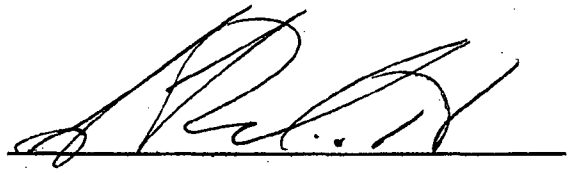
(e) The information is vital to a competitive advantage held by AREVA NP, would be helpful to competitors to AREVA NP, and would likely cause substantial harm to the competitive position of AREVA NP.

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

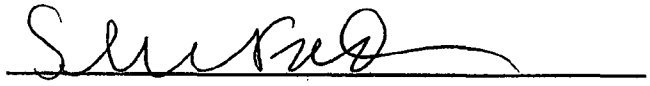
7. In accordance with AREVA NP's policies governing the protection and control of information, proprietary information contained in this Document have been made available, on a limited basis, to others outside AREVA NP only as required and under suitable agreement providing for nondisclosure and limited 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 23rd day of May, 2008.



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