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

April 15, 2014

10 CFR 50.4
10 CFR 50.46

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

Browns Ferry Nuclear Plant, Units 1, 2, and 3
Renewed Facility Operating License Nos. DPR-33, DPR-52, and DPR-68
NRC Docket Nos. 50-259, 50-260, and 50-296

Subject: **10 CFR 50.46 Annual Report for Browns Ferry Nuclear Plant, Units 1 and 2, and 10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Unit 3**

Reference: 1. Letter from TVA to NRC, "Title 10 of the Code of Federal Regulations (10 CFR) 50.46 Annual Report for Browns Ferry Nuclear Plant, Unit 1, and 10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Units 2 and 3," dated April 30, 2013. (ML13123A011)

The purpose of this letter is to provide the annual report, as required by Title 10 of the Code of Federal Regulations (10 CFR) 50.46, of changes or errors discovered in the Emergency Core Cooling System (ECCS) evaluation model for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. In accordance with 10 CFR 50.46, "Acceptance Criteria for ECCS for Light-Water Nuclear Power Reactors," paragraph (a)(3)(ii), Enclosures 1, 2, and 3 describe the nature and the estimated effect on the limiting ECCS analysis of changes or errors discovered since submittal of Reference 1 for BFN, Units 1, 2, and 3.

Enclosure 1 to this letter contains a summary of changes to the calculated peak cladding temperature (PCT) made to the BFN, Unit 1, ECCS-Loss of Coolant Accident (LOCA) analysis of record (AOR). The baseline GE14 fuel PCT for BFN, Unit 1, is 1760°F. This report establishes a new baseline ATRIUM™-10 fuel PCT of 1944°F for BFN, Unit 1.

Enclosure 2 to this letter contains a summary of changes to the calculated PCT made to the BFN, Unit 2, ECCS-LOCA AOR. This report establishes a new baseline ATRIUM™-10 fuel PCT of 1944°F for BFN, Unit 2.

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Enclosure 3 to this letter contains a summary of changes to the calculated PCT made to the BFN, Unit 3, ECCS-LOCA AOR. This report establishes a new baseline ATRIUM™-10 fuel PCT of 1944°F for BFN, Unit 3.

Enclosure 3 also serves as the 30-day report of a significant change to the BFN, Unit 3, ECCS-LOCA AOR. As described in the enclosure, a revised AOR is established at the end of the Spring 2014 refueling outage, for BFN, Unit 3, with a new baseline PCT of 1944°F. When combined with previously reported changes and/or errors to the AOR, this results in a 52°F change from the previously reported baseline PCT of 1926°F.

There are no new regulatory commitments in this letter. Please direct questions concerning this issue to Jamie L. Paul at (256) 729-2636.

Respectfully,

K. J. Polson
Site Vice President

Enclosures:

1. 10 CFR 50.46 Annual Report for Browns Ferry Nuclear Plant, Unit 1
2. 10 CFR 50.46 Annual Report for Browns Ferry Nuclear Plant, Unit 2
3. 10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Unit 3

cc (w/Enclosure):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Browns Ferry Nuclear Plant
NRC Project Manager - Browns Ferry Nuclear Plant

ENCLOSURE 1

10 CFR 50.46 ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 1

The Browns Ferry Nuclear Plant (BFN), Unit 1, core contains both the ATRIUM™-10 and GE14 fuel designs. This report establishes a new baseline peak cladding temperature (PCT) value for ATRIUM™-10 fuel, as described below.

ATRIUM™-10 Fuel Evaluation

The previous 10 CFR 50.46 report (Reference 1) for BFN, Unit 1, was submitted on April 30, 2013. This report cites References 2 and 3 as the analysis of record (AOR) for ATRIUM™-10 fuel, with a baseline PCT for ATRIUM™-10 fuel of 1926°F.

The Reference 3 analysis has been revised by Reference 4, establishing a new baseline PCT of 1944°F. No new changes or errors have been discovered in the AREVA loss of coolant accident (LOCA) analyses since the issuance of Reference 4.

Table 1 details the accumulated PCT impact due to errors and changes in the LOCA analyses since the AOR in Reference 4 of this enclosure.

Table 1: Cumulative Effect of PCT Changes - BFN, Unit 1 (ATRIUM™-10)	
Previous Baseline PCT (Reference 3)	1926°F
New Baseline PCT (Reference 4)	1944°F
Thermal Conductivity Degradation (previously reported and still applicable to revised AOR in Reference 4)	+ 0°F
Accumulated changes since baseline analysis	+ 0°F
New licensing PCT	**1944°F**
Absolute value of accumulated changes relative to new baseline PCT	+ 0°F

ENCLOSURE 1

10 CFR 50.46 ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 1

GE14 Fuel Evaluation

The previous 10 CFR 50.46 report (Reference 1) for BFN, Unit 1, was submitted on April 30, 2013. This report cites Reference 5 as the AOR for GE14 fuel. The applicability of this analysis to the current plant configuration was confirmed by GE-Hitachi in Reference 6. Reference 5 provides PCT results for both Current Licensed Thermal Power (CLTP) and Extended Power Uprate (EPU) conditions. TVA has elected to use the CLTP results for 10 CFR 50.46 reporting, because EPU has not been approved for BFN, Unit 1, and all GE14 fuel is scheduled to be discharged prior to the planned EPU implementation date. The baseline PCT for GE14 fuel at CLTP conditions is 1760°F.

No new changes or errors have been discovered in the GE14 LOCA analysis since the issuance of Reference 1.

Table 2 details the accumulated PCT impact due to errors and changes in the GE14 LOCA analyses since the AOR in Reference 5 of this enclosure.

Table 2: Cumulative Effect of PCT Changes - BFN, Unit 1 (GE14)	
Baseline PCT	1760°F
Input coefficient database error (previously reported in Reference 1 of this enclosure)	+25°F
Revised gamma heat deposition formulation (previously reported in Reference 1 of this enclosure)	+15°F
Pellet thermal conductivity degradation (previously reported in Reference 1 of this enclosure)	+0°F
Accumulated changes since baseline analysis	+40°F
New licensing PCT	**1800°F**
Absolute value of accumulated changes	40°F

ENCLOSURE 1

10 CFR 50.46 ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 1

References

1. Letter from TVA to NRC, "Title 10 of the Code of Federal Regulations (10 CFR) 50.46 Annual Report for Browns Ferry Nuclear Plant, Unit 1, and 10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Units 2 and 3," dated April 30, 2013.

2. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis," ANP-3015(P) Revision 0, September 2011.

3. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limit for ATRIUM™-10 Fuel," ANP-3016(P) Revision 0, December 2011.

4. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limit for ATRIUM™-10 Fuel," ANP-3016(P) Revision 1, November 2013.

5. GE Nuclear Energy, "Browns Ferry Nuclear Plant Units 1, 2, and 3: SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," NEDC-32484P Revision 6, February 2005.

6. GE-Hitachi Nuclear Energy, "Browns Ferry Nuclear Plant Unit 1: Supplementary Report Regarding ECCS-LOCA Evaluation Additional Single Failure Evaluation at Current Licensed Thermal Power," NEDC-32484P Rev. 6, Supplement 2, September 2012.

ENCLOSURE 2

10 CFR 50.46 ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 2

The Browns Ferry Nuclear Plant (BFN), Unit 2, core contains only the ATRIUM™-10 fuel design.

Description of Changes and Errors Relative to the Previous Report

The previous 10 CFR 50.46 report (Reference 1) for BFN, Unit 2, was submitted on April 30, 2013. This report cites References 2 and 3 as the analysis of record (AOR) for ATRIUM-10™ fuel, with a baseline peak cladding temperature (PCT) for ATRIUM-10™ fuel of 1926°F.

The Reference 3 analysis has been revised by Reference 4, establishing a new baseline PCT of 1944°F. No new changes or errors have been discovered in the AREVA loss of coolant accident (LOCA) analyses since the issuance of Reference 4.

Table 1 details the accumulated PCT impact due to errors and changes in the LOCA analyses since the AOR in Reference 4 of this enclosure.

Table 1: Cumulative Effect of PCT Changes - BFN, Unit 2 (ATRIUM™-10)	
Previous Baseline PCT (Reference 3)	1926°F
New Baseline PCT (Reference 4)	1944°F
Thermal Conductivity Degradation (previously reported and still applicable to revised AOR in Reference 4)	+ 0°F
Accumulated changes since baseline analysis	+ 0°F
New licensing PCT	**1944°F**
Absolute value of accumulated changes relative to new baseline PCT	+ 0°F

ENCLOSURE 2

10 CFR 50.46 ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 2

References

1. Letter from TVA to NRC, "Title 10 of the Code of Federal Regulations (10 CFR) 50.46 Annual Report for Browns Ferry Nuclear Plant, Unit 1, and 10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Units 2 and 3," dated April 30, 2013.

2. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis," ANP-3015(P) Revision 0, September 2011.

3. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limit for ATRIUM™-10 Fuel," ANP-3016(P) Revision 0, December 2011.

4. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limit for ATRIUM™-10 Fuel," ANP-3016(P) Revision 1, November 2013.

ENCLOSURE 3

10 CFR 50.46 30-DAY AND ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 3

The Browns Ferry Nuclear Plant (BFN), Unit 3, core contains only the ATRIUM™-10 fuel design.

Description of Changes and Errors Relative to the Previous Report

The previous 10 CFR 50.46 report (Reference 1) for BFN, Unit 3, was submitted on April 30, 2013 (Reference 1). This report cites References 2 and 3 as the analysis of record (AOR) for ATRIUM™-10 fuel, with a baseline peak cladding temperature (PCT) for ATRIUM-10™ fuel of 1926°F.

The Reference 3 analysis has been revised by Reference 4, establishing a new baseline PCT of 1944°F. No new changes or errors have been discovered in the AREVA loss of coolant accident (LOCA) analyses since the issuance of Reference 4.

The change in baseline PCT (1944 - 1926 = 18°F), combined with previously reported changes and/or errors in the AOR (34°F), yields a net change of 52°F relative to the previously reported baseline PCT. This exceeds the 50°F threshold for a "significant" change or error established in 10 CFR 50.46(a)(3)(iii). Therefore, a 30-day report is required. Because the maximum PCT is less than the 2200°F acceptance criteria established in 10 CFR 50.46(b)(1), no reanalysis or other actions are required to ensure continued compliance with 10 CFR 50.46 requirements.

Table 1 details the accumulated PCT impact due to errors and changes in the LOCA analyses since the AOR in Reference 4 of this enclosure.

Table 1: Cumulative Effect of PCT Changes - BFN, Unit 3

Previous Baseline PCT (Reference 3)	1926°F
New Baseline PCT (Reference 4)	1944 °F
Increased core spray leakage from lower sectional replacement hardware modification analysis (previously reported and still applicable to revised AOR in Reference 4)	+ 34 °F
Thermal Conductivity Degradation (previously reported and still applicable to revised AOR in Reference 4)	+ 0 °F
Accumulated changes since baseline analysis	+ 34 °F
New licensing PCT	**1978 °F**
Absolute value of accumulated changes relative to new baseline PCT	34 °F

ENCLOSURE 3

10 CFR 50.46 30-DAY AND ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 3

References

1. Letter from TVA to NRC, "Title 10 of the Code of Federal Regulations (10 CFR) 50.46 Annual Report for Browns Ferry Nuclear Plant, Unit 1, and 10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Units 2 and 3," dated April 30, 2013.

2. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis," ANP-3015(P) Revision 0, September 2011.

3. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limit for ATRIUM™-10 Fuel," ANP-3016(P) Revision 0, December 2011.

4. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limit for ATRIUM™-10 Fuel," ANP-3016(P) Revision 1, November 2013.