



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

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December 22, 2015

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, Unit 2  
Renewed Facility Operating License No. DPR-52  
NRC Docket No. 50-260

**Subject: 10 CFR 50.46 30-Day Report for Browns Ferry Nuclear Plant, Unit 2**

**Reference:** Letter from TVA to NRC, "10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Units 1, 2, and 3," dated April 30, 2015 (ML15120A295)

The purpose of this letter is to provide a 30-Day 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), Unit 2. In accordance with 10 CFR 50.46, "Acceptance Criteria for ECCS for Light-Water Nuclear Power Reactors," paragraph (a)(3)(ii), the Enclosure describes the nature and the estimated effect on the limiting ECCS analysis, of changes or errors discovered since submittal of the Reference above for BFN, Unit 2.

The Peak Cladding Temperature (PCT) changes and errors identified for BFN, Unit 2, described in the enclosed report, when expressed as cumulative sums of the absolute magnitudes, exceed 50 degrees Fahrenheit (°F). In accordance with 10 CFR 50.46(a)(3)(ii), a holder of an operating license or construction permit is required to report changes and errors affecting an ECCS evaluation model to the NRC within 30 days when the cumulative sum of the absolute magnitudes of resulting PCT changes exceeds 50°F. The licensee is also required to include with the report, a proposed schedule for providing a reanalysis or taking other action as may be needed to show compliance with the 10 CFR 50.46 requirements. Notification of the PCT changes and errors was received from AREVA on December 1, 2015; therefore, the 30-Day Report is due by December 31, 2015.

The Enclosure to this letter serves as a 30-day report of significant changes to the BFN, Unit 2, ECCS-Loss of Coolant Accident analysis of record for ATRIUM™-10XM fuel. This report establishes a new baseline ATRIUM™-10XM fuel PCT of 1906 °F for BFN, Unit 2. The fuel PCT values for the ATRIUM™-10 and ATRIUM™-11 fuel types are unchanged from the previous report.

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As presented in this report, compliance with 10 CFR 50.46 requirements is demonstrated by the calculated PCT for BFN, Unit 2, remaining below the 2200°F limit. The other requirements in 10 CFR 50.46(b) are not impacted by the change. Therefore, the Tennessee Valley Authority has concluded that the loss of coolant accident analyses continue to show compliance with 10 CFR 50.46 requirements and no proposed schedule for providing a reanalysis or other action is required.

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

Respectfully,

A handwritten signature in blue ink, appearing to read 'S. M. Bono', with a stylized flourish at the end.

S. M. Bono  
Site Vice President

Enclosure:

10 CFR 50.46 30-Day Report for Browns Ferry Nuclear Plant, Unit 2

cc (w/Enclosure):

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

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Enclosure  
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## ENCLOSURE

### 10 CFR 50.46 30-DAY REPORT FOR BROWNS FERRY NUCLEAR PLANT, UNIT 2

The Browns Ferry Nuclear Plant (BFN), Unit 2, core contains both the ATRIUM™-10 and ATRIUM™-10XM fuel designs, as well as ATRIUM™-11 lead-use assemblies.

#### **ATRIUM™-10 Fuel Evaluation**

The previous 10 CFR 50.46 report (Reference 1) for BFN, Unit 2, was submitted on April 30, 2015. 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 1944°F.

No new changes or errors have been discovered in the AREVA loss of coolant accident (LOCA) analyses since the issuance of the Reference 1 report.

Table 1 details the accumulated PCT impact due to changes and errors affecting the LOCA analyses in the Reference 2 and 3 AOR for ATRIUM™-10 fuel in BFN, Unit 2.

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**10 CFR 50.46 30-DAY REPORT  
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BROWNS FERRY NUCLEAR PLANT, UNIT 2**

<b>Table 1: Cumulative Effect of PCT Changes - BFN, Unit 2 (ATRIUM™-10)</b>	
Baseline PCT (Reference 3)	1944°F
Thermal Conductivity Degradation (previously reported)	+ 0°F
Recirculation pump characteristics (flow, pump speed, and pump power) (previously reported)	+ 9°F
Rated recirculation pump torque (previously reported)	+ 28°F
Elevation of bottom vessel flange (previously reported)	- 5°F
In-core detector housing diameter (previously reported)	+ 17°F
Jet pump riser inlet thermal sleeve diameter (previously reported)	+ 4°F
Rams head diameter (previously reported)	+ 1°F
Dryer water seal skirt diameter (previously reported)	- 6°F
Core plate girder support width (previously reported)	+ 1°F
Main steam line diameter (previously reported)	+ 2°F
Accumulated changes since baseline analysis	+ 51°F
New licensing PCT	<b>1995°F</b>
Absolute value of accumulated changes	73°F

## ENCLOSURE

### 10 CFR 50.46 30-DAY REPORT FOR BROWNS FERRY NUCLEAR PLANT, UNIT 2

#### **ATRIUM™-10XM Fuel Evaluation**

The previous 10 CFR 50.46 report (Reference 1) for BFN, Unit 2, was submitted on April 30, 2015. This report cites References 4 and 5 as the AOR for ATRIUM™-10XM fuel, with a baseline PCT of 1903°F.

The Reference 5 analysis has been revised by Reference 6, establishing a new baseline PCT of 1906°F. No new changes or errors have been discovered in the AREVA LOCA analyses since the issuance of Reference 6. Previously reported changes and errors for ATRIUM™-10XM fuel remain applicable to the revised AOR.

The revised AOR for ATRIUM™-10XM fuel in BFN, Unit 2, consists of References 4 and 6. Table 2 details the accumulated changes and errors impacting the PCT reported in Reference 6.

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<b>Table 2: Cumulative Effect of PCT Changes - BFN, Unit 2 (ATRIUM™-10XM)</b>	
Old Baseline PCT (Reference 5)	1903°F
New Baseline PCT (Reference 6)	1906°F
Implementation of ACE correlation in RELAX (previously reported)	+ 0°F
Implementation of modified analysis approach (previously reported)	+ 0°F
Thermal Conductivity Degradation (previously reported)	+ 0°F
Recirculation pump characteristics (flow, pump speed, and pump power) (previously reported)	+ 9°F
Rated recirculation pump torque (previously reported)	+ 28°F
Elevation of bottom vessel flange (previously reported)	- 5°F
In-core detector housing diameter (previously reported)	+ 17°F
Jet pump riser inlet thermal sleeve diameter (previously reported)	+ 4°F
Rams head diameter (previously reported)	+ 1°F
Dryer water seal skirt diameter (previously reported)	- 6°F
Core plate girder support width (previously reported)	+ 1°F
Main steam line diameter (previously reported)	+ 2°F
Accumulated changes since baseline analysis	+ 51°F
New licensing PCT	<b>1957°F</b>
Absolute value of accumulated changes	73°F

## ENCLOSURE

### 10 CFR 50.46 30-DAY REPORT FOR BROWNS FERRY NUCLEAR PLANT, UNIT 2

#### **ATRIUM™-11 Fuel Evaluation**

The previous 10 CFR 50.46 report (Reference 1) for BFN, Unit 2, was submitted on April 30, 2015. This report cites Reference 7 as the AOR for ATRIUM™-11 fuel, with a baseline PCT of 1876°F.

No new changes or errors have been discovered in the AREVA LOCA analyses since the issuance of the Reference 1 report.

Table 3 details the accumulated PCT impact due to changes and errors affecting the LOCA analyses in the Reference 7 AOR for ATRIUM™-11 fuel in BFN, Unit 2.



**ENCLOSURE**

**10 CFR 50.46 30-DAY REPORT  
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<b>Table 3: Cumulative Effect of PCT Changes - BFN, Unit 2 (ATRIUM™-11)</b>	
Baseline PCT (Reference 7)	1876°F
Implementation of ACE correlation in RELAX (previously reported)	+ 0°F
Implementation of modified analysis approach (previously reported)	+ 0°F
Thermal Conductivity Degradation (previously reported)	+ 0°F
Recirculation pump characteristics (flow, pump speed, and pump power) (previously reported)	+ 9°F
Rated recirculation pump torque (previously reported)	+ 28°F
Elevation of bottom vessel flange (previously reported)	- 5°F
In-core detector housing diameter (previously reported)	+ 17°F
Jet pump riser inlet thermal sleeve diameter (previously reported)	+ 4°F
Rams head diameter (previously reported)	+ 1°F
Dryer water seal skirt diameter (previously reported)	- 6°F
Core plate girder support width (previously reported)	+ 1°F
Main steam line diameter (previously reported)	+ 2°F
Accumulated changes since baseline analysis	+ 51°F
New licensing PCT	<b>1927°F</b>
Absolute value of accumulated changes	73°F

## ENCLOSURE

### 10 CFR 50.46 30-DAY REPORT FOR BROWNS FERRY NUCLEAR PLANT, UNIT 2

#### References

1. Letter from TVA to NRC, "10 CFR 50.46 30-Day and Annual Report for Browns Ferry Nuclear Plant, Units 1, 2, and 3," dated April 30, 2015. (ML15120A295)
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<sup>TM</sup>-10 Fuel," ANP-3016(P) Revision 1, November 2013.
4. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA Break Spectrum Analysis for ATRIUM<sup>TM</sup> 10XM Fuel," ANP-3152(P) Revision 0, October 2012.
5. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM<sup>TM</sup> 10XM Fuel," ANP-3153(P) Revision 0, October 2012.
6. AREVA NP Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM<sup>TM</sup> 10XM Fuel," ANP-3153(P) Revision 1, December 2015.
7. AREVA NP Inc., "Browns Ferry Unit 2 Cycle 19 Reload Analysis," ANP-3354 Revision 0, November 2014.