



1101 Market Street, Chattanooga, Tennessee 37402

CNL-22-051

April 29, 2022

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: Browns Ferry Nuclear Plant, Units 1, 2, and 3 – 10 CFR 50.46 Annual Report

- References:
1. TVA Letter to NRC, "Browns Ferry Nuclear Plant, Units 1, 2, and 3, 10 CFR 50.46 Annual Report," dated April 30, 2021 (ML21120A164)
 2. NRC Letter to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Issuance of Amendments Regarding Extended Power Uprate (CAC Nos. MF6741, MF6742, and MF6743)," dated August 14, 2017 (ML17032A120)
 3. NRC Letter to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Issuance of Amendment Nos. 310, 333, and 293 Regarding Maximum Extended Load Line Limit Analysis Plus (EPID L-2018-LLA-0048)," dated December 26, 2019 (ML19210C308)

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 evaluation model for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3.

As noted in the previous submittal of the annual report (Reference 1), all three BFN units have now implemented their Extended Power Uprate operation, as approved in Reference 2, and their Maximum Extended Load Line Limit Analysis Plus operation, as approved in Reference 3.

This submittal satisfies the annual reporting requirement of 10 CFR 50.46(a)(3)(ii) for BFN Units 1, 2, and 3.

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As presented in this report, compliance with 10 CFR 50.46 requirements is demonstrated by the calculated peak cladding temperature for all three BFN units remaining below the 2200 degrees Fahrenheit limit. Therefore, Tennessee Valley Authority has concluded that no proposed schedule for providing a reanalysis or other action is required.

There are no new regulatory commitments associated with this submittal. Please address any questions to Chris L. Vaughn, Manager, Site Licensing, at clvaughn@tva.gov.

Respectfully,



Matthew M. Rasmussen
Site Vice President
Browns Ferry Nuclear Plant

Enclosure:

10 CFR 50.46 Annual Report for BFN Units 1, 2, and 3

cc (Enclosure):

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

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

The Browns Ferry Nuclear Plant (BFN) Unit 1 core contains the ATRIUM™-10XM fuel designs. The previous Title 10 of the *Code of Federal Regulations* (10 CFR) 50.46 Annual Report for BFN was submitted per Reference 1. Since the issuance of Reference 1, no new baseline analysis supporting Extended Power Uprate (EPU) Maximum Extended Load Line Limit Analysis Plus (MELLLA+) conditions has been generated.

Fuel Evaluation

Table 1 details the accumulated peak cladding temperature (PCT) impact due to errors and changes in the loss of coolant accident (LOCA) analysis since the previously reported analysis of record (AOR) (Reference 1).

Table 1: Cumulative Effect of PCT Changes – BFN Unit 1 (ATRIUM-10XM)	
Baseline PCT (Reference 2)	2052°F
All thermal conductivity degradation effects (Reference 2, Section 5.1)	+ 0°F
Increased Access Hole Cover and low pressure coolant injection (LPCI) Leakages (Reference 3)	+ 0°F
RDX2_2_RDX4 Corrections (Reference 3)	+ 0°F
New licensing PCT	2052°F
Absolute value of accumulated changes since last baseline analysis	0°F

References (Unit 1)

1. TVA Letter to NRC, “Browns Ferry Nuclear Plant, Units 1, 2, and 3, 10 CFR 50.46 Annual Report,” dated April 30, 2021 (ML21120A164)
2. Framatome Inc., “Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM 10XM Fuel (EPU MELLLA+),” ANP-3547P, Revision 2, January 2020
3. Framatome Inc., “10 CFR 50.46 PCT Error Report for Browns Ferry Units 1, 2, and 3 with EPU/MELLLA+ Conditions,” FS1-0044279, Revision 4, November 19, 2021

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

The BFN Unit 2 core contains the ATRIUM-10XM fuel designs and a limited number of ATRIUM-11 lead fuel assemblies (LFAs). The previous 10 CFR 50.46 Annual Report for BFN was submitted per Reference 1. Since the issuance of Reference 1, no new baseline analysis supporting EPU MELLLA+ conditions has been generated.

Fuel Evaluation

Tables 2 and 3 detail the accumulated PCT impact due to errors and changes in the LOCA analysis since the previously reported AOR (Reference 1).

Table 2: Cumulative Effect of PCT Changes – BFN Unit 2 (ATRIUM-10XM)	
Baseline PCT (Reference 2)	2052°F
All thermal conductivity degradation effects (Reference 2, Section 5.1)	+ 0°F
Increased Access Hole Cover and LPCI Leakages (Reference 3)	+ 0°F
RDX2_2_RDX4 Corrections (Reference 3)	+ 0°F
New licensing PCT	2052°F
Absolute value of accumulated changes since last baseline analysis	0°F

Table 3: Cumulative Effect of PCT Changes – BFN Unit 2 (ATRIUM-11 LFAs)	
Baseline PCT (Reference 3)	1903°F
All thermal conductivity degradation effects (Reference 1)	+ 0°F
RODEX4 Axial Pellet-Cladding Mechanical Interaction Onset (Reference 3)	+ 0°F
AUTOHUP inputs preparation of RODEX2-2A inputs (Reference 3)	+ 2°F
Increased Access Hole Cover and LPCI Leakages (Reference 3)	+ 0°F
RDX2_2_RDX4 Corrections (Reference 3)	+ 0°F
New licensing PCT	1905°F
Absolute value of accumulated changes	2°F

Enclosure

References (Unit 2)

1. TVA Letter to NRC, "Browns Ferry Nuclear Plant, Units 1, 2, and 3, 10 CFR 50.46 Annual Report," dated April 30, 2021 (ML21120A164)
2. Framatome Inc., "Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM 10XM Fuel (EPU MELLLA+)," ANP-3547P, Revision 2, January 2020
3. Framatome Inc., "10 CFR 50.46 PCT Error Report for Browns Ferry Units 1, 2, and 3 with EPU/MELLLA+ Conditions," FS1-0044279, Revision 4, November 19, 2021

**10 CFR 50.46 ANNUAL REPORT
FOR
BROWNS FERRY NUCLEAR PLANT, UNIT 3**

The BFN Unit 3 core contains the ATRIUM-10XM fuel designs. The previous 10 CFR 50.46 Annual Report for BFN was submitted per Reference 1. Since the issuance of Reference 1, no new baseline analysis supporting EPU MELLLA+ conditions has been generated.

Fuel Evaluation

Table 4 details the accumulated PCT impact due to errors and changes in the LOCA analysis since the previously reported AOR (Reference 1).

Table 4: Cumulative Effect of PCT Changes – BFN Unit 3 (ATRIUM-10XM)	
Baseline PCT (Reference 2)	2052°F
All thermal conductivity degradation effects (Reference 2, Section 5.1)	+ 0°F
Increased Access Hole Cover and LPCI Leakages (Reference 3)	+ 0°F
RDX2_2_RDX4 Corrections (Reference 3)	+ 0°F
New licensing PCT	2052°F
Absolute value of accumulated changes since last baseline analysis	0°F

References (Unit 3)

1. TVA Letter to NRC, “Browns Ferry Nuclear Plant, Units 1, 2, and 3, 10 CFR 50.46 Annual Report,” dated April 30, 2021 (ML21120A164)
2. Framatome Inc., “Browns Ferry Units 1, 2, and 3 LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM 10XM Fuel (EPU MELLLA+),” ANP-3547P, Revision 2, January 2020
3. Framatome Inc., “10 CFR 50.46 PCT Error Report for Browns Ferry Units 1, 2, and 3 with EPU/MELLLA+ Conditions,” FS1-0044279, Revision 4, November 19, 2021