TENNESSEE VALLEY AUTHORITY

Post Office Box 2000, Decatur, Alabama 35609-2000

April 30, 2021

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, "10 CFR 50.46 Annual Report for Browns Ferry Nuclear Plant, Units 1, 2, and 3," dated April 27, 2020 (ML20118C466)
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 approved extended power uprate operation as approved in Reference 2. Also, all three BFN units have implemented 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.

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, TVA has concluded that no proposed schedule for providing a reanalysis or other action is required.

There are no new regulatory commitments contained in this letter. If you have any questions regarding this submittal, please contact J. L. Paul, Manager, Site Licensing, at (256) 729-2636.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 30th day of April 2021.

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
State Health Officer, Alabama Department of Public Health

TJO:KDH

bcc (Enclosure):

BFN Standard Distribution
D. M. Brown
C. Carey
K. D. Hulvey
T. W. Eichenberg

ECM

ENCLOSURE

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 10 CFR 50.46 Report for BFN, was submitted per Reference 1. Since the issuance of Reference 1, a new baseline analysis supporting Maximum Extended Load Line Limit Analysis Plus (MELLLA+) conditions has been generated using the approved methodology; effective with the start of Cycle 14.

Fuel Evaluation

Table 1 details the accumulated peak cladding temperature (PCT) impact due to errors and changes in the loss of coolant accident analysis since the previously reported analysis of record (AOR) Reference 1. Since the time Reference 1 was published, PCT analysis has been re-baselined per Reference 2.

Table 1: Cumulative Effect of PCT Changes - BFN, Unit 1 (ATRIUM™-10XM)

Baseline PCT (Reference 2)	2052°F
Thermal conductivity degradation effects (Reference 2, Section 5.1) Increased Access Hole Cover and LPCI Leakages (Reference 3)	+ 0°F + 0°F
New licensing PCT	**2052°F**
Absolute value of accumulated changes since last baseline analysis	0°F

References (Unit 1)

1. Letter from TVA to NRC, “10 CFR 50.46 Annual Report for Browns Ferry Nuclear Plant, Units 1, 2, and 3,” dated April 27, 2020, (ML20118C466)

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 2, April 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. The previous 10 CFR 50.46 Annual Report for BFN, was submitted per Reference 1. Since the issuance of Reference 1, Unit 2 has begun approved operation under EPU/MELLLA+.

Fuel Evaluation

Tables 2 & 3 detail the accumulated PCT impact due to errors and changes in the loss of coolant accident analysis since the previously reported AOR Reference 1.

Table 2: Cumulative Effect of PCT Changes - BFN, Unit 2 (ATRIUM-11 LFA's)

Baseline PCT (Reference 3)	1903°F
Thermal conductivity degradation effects (Reference 1) RODEX4 Axial PCMI Onset (Reference 3) AUTOHUP inputs & options (Reference 3) Increased Access Hole Cover and LPCI Leakages (Reference 3)	+ 0°F +0°F + 2°F + 0°F
New licensing PCT	**1905°F**
Absolute value of accumulated changes	2°F

Table 3: Cumulative Effect of PCT Changes - BFN, Unit 2 (ATRIUM-10XM)

Baseline PCT (Reference 2)	2052°F
Thermal conductivity degradation effects (Reference 2, Section 5.1) Increased Access Hole Cover and LPCI Leakages (Reference 3)	+ 0°F + 0°F
New licensing PCT	**2052°F**
Absolute value of accumulated changes since last baseline analysis	0°F

References (Unit 2)

1. Letter from TVA to NRC, "10 CFR 50.46 Annual Report for Browns Ferry Nuclear Plant, Units 1, 2, and 3," dated April 27, 2020, (ML20118C466)

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 2, April 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.

Fuel Evaluation

Table 4 details the accumulated PCT impact due to errors and changes in the loss of coolant accident 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
Thermal conductivity degradation effects (Reference 2, Section 5.1) Increased Access Hole Cover and LPCI Leakage. (Reference 3)	+ 0°F + 0°F
New licensing PCT	**2052°F**
Absolute value of accumulated changes since last baseline analysis	0°F

References (Unit 3)

1. Letter from TVA to NRC, "10 CFR 50.46 Annual Report for Browns Ferry Nuclear Plant, Units 1, 2, and 3," dated April 27, 2020, (ML20118C466)

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 2, April 2021