TENNESSEE VALLEY AUTHORITY

Post Office Box 2000, Spring City, Tennessee 37381

WBL-21-050

October 28, 2021

10 CFR 50.4
10 CFR 50.46

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

Watts Bar Nuclear Plant, Unit 2
Facility Operating License No. NPF-96
NRC Docket No. 50-391

Subject: **10 CFR 50.46 – 30-Day Report for Watts Bar Nuclear Unit 2**

Reference: TVA Letter to NRC, WBL-21-009, "10 CFR 50.46 Annual Report for Watts Bar Nuclear Plant Units 1 and 2," dated March 4, 2021 (ML21063A176)

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.46, "Acceptance Criteria for ECCS for Light-Water Nuclear Power Reactors," paragraph (a)(3)(ii), the purpose of this letter is to provide the 30-day report of changes in the emergency core cooling system (ECCS) evaluation model for the Watts Bar Nuclear Plant (WBN) Unit 2. 10 CFR 50.46 requires that a holder of an operating license is required to report significant changes and errors affecting an ECCS evaluation model to the NRC within 30 days when the cumulative sum of the absolute magnitudes of resulting peak cladding temperature (PCT) changes exceeds 50°F. This report is the result of the implementation of a Reactor Coolant System (RCS) average temperature (T_{avg}) window and results in a 0°F change in PCT. Because the accumulated changes and errors in the large-break loss of coolant accident (LBLOCA) analysis from previous years are greater than 50°F (Reference), a 30-day report is required in accordance with 10 CFR 50.46(a)(3)(ii). The change to the T_{avg} operating window was implemented on WBN Unit 2 on September 30, 2021.

The enclosure to this letter provides the 30-day report of significant changes to WBN Unit 2 and describes the nature and the estimated effect on the limiting ECCS analysis of changes since the referenced letter for WBN Unit 2.

10 CFR 50.46(a)(3)(ii) also requires the licensee to provide 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. As shown in this report, compliance with 10 CFR 50.46 requirements is demonstrated by the calculated PCT for WBN Unit 2 remaining below the 2200°F limit. Therefore, TVA has concluded that no proposed schedule for providing a reanalysis or other action is required. No further actions are needed to show compliance with 10 CFR 50.46 requirements.

There are no regulatory commitments in this letter. Please address any questions regarding this response to Michael A. Brown at (423) 365-7720.

Respectfully,

Anthony L. Williams IV
Site Vice President
Watts Bar Nuclear Plant

Enclosure: Watts Bar Nuclear Plant Unit 2, 10 CFR 50.46 30-Day Report

cc (Enclosure):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant
NRC Project Manager – Watts Bar Nuclear Plant
Director, Division of Radiological Health – Tennessee State Department of Environment and Conservation

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Watts Bar Nuclear Plant Unit 2, 10 CFR 50.46 30-Day Report

In accordance with the reporting requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.46(a)(3)(ii), Tennessee Valley Authority (TVA) is providing the following 30-day report of changes in the emergency core cooling system (ECCS) evaluation model for the Watts Bar Nuclear Plant (WBN) Unit 2. 10 CFR 50.46 requires that a holder of an operating license is required to report significant changes and errors affecting an ECCS evaluation model to the NRC within 30 days when the cumulative sum of the absolute magnitudes of resulting peak cladding temperature (PCT) changes exceeds 50°F. This report is the result of the implementation of a Reactor Coolant System (RCS) average temperature (Tavg) window and results in a 0°F change in PCT . Because the accumulated changes and errors in the large-break loss of coolant accident (LBLOCA) analysis from previous years are greater than 50°F, a 30-day report is required in accordance with 10 CFR 50.46(a)(3)(ii). The change to the Tavg operating window was implemented on WBN Unit 2 on September 30, 2021.

TVA submitted the last 10 CFR 50.46 annual report for WBN Units 1 and 2 to the Nuclear Regulatory Commission in Reference 1 of this Enclosure.

Table 1 lists the changes and errors in the large break LOCA (LBLOCA) analysis for WBN Unit 2 since the analysis of record (AOR) and the associated effect on PCT. Table 2 lists the changes and errors in the small break LOCA (SBLOCA) analyses for WBN Unit 2 since the AOR and the associated effect on PCT. The changes that were not previously identified in Reference 1 are described in the notes to Tables 1 and 2.

The updated (net) licensing basis PCT for the LBLOCA and SBLOCA remain unchanged for WBN Unit 2 from the last annual report.

As presented in this report, compliance with 10 CFR 50.46 requirements is demonstrated by the calculated PCT for both WBN units remaining below the 2200°F limit. Therefore, TVA has concluded that no proposed schedule for providing a reanalysis or other action is required.

Table 1
Watts Bar Unit 2 LBLOCA

Year	Description	LBLOCA ΔPCT (°F)	LBLOCA |ΔPCT| (°F)	Note	Reference
2013	**LBLOCA AOR PCT**	**1766**	- - -	- - -	6
2013	Elevations for Heat Slab Temperature Initialization	0	0	- - -	8
2013	Heat Transfer Model Error Corrections	0	0	- - -	8
2013	Correction to Heat Transfer Node Initialization	0	0	- - -	8
2013	Mass Conservation Error Fix	0	0	- - -	8
2013	Correction to Split Channel Momentum Equation	0	0	- - -	8
2013	Heat Transfer Logic Correction for Rod Burst Calculation	0	0	- - -	8
2013	Changes to Vessel Superheated Steam Properties	0	0	- - -	8
2013	Update to Metal Density Reference Temperatures	0	0	- - -	8
2013	Decay Heat Model Error Corrections	0	0	- - -	8
2013	Correction to the Pipe Exit Pressure Drop Error	0	0	- - -	8
2013	WCOBRA/TRAC File Dimension Error Correction	0	0	- - -	8
2013	Revised Heat Transfer Multiplier Distributions	-55	55	- - -	8
2013	Initial Fuel Pellet Average Temperature Uncertainty Calculation	0	0	- - -	8
2013	HOTSPOT Burst Strain Error	0	0	- - -	5
2014	Cold Leg Accumulator Injection Lines Hydraulic Resistance Changes	0	0	- - -	4
2014	General Computer Code Maintenance	0	0	- - -	9

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Table 1
Watts Bar Unit 2 LBLOCA

Year	Description	LBLOCA ΔPCT (°F)	LBLOCA |ΔPCT| (°F)	Note	Reference
2014	Errors in Decay Group Uncertainty Factors	0	0	- - -	9
2014	Treatment of Burnup Effects on Thermal Conductivity Degradation	0	0	- - -	9
2016	General Code Maintenance	0	0	- - -	11
2016	Clad Oxidation Calculation	0	0	- - -	11
2016	Use of Steam Tables in Upper Head Fluid Temperature Calculations	0	0	- - -	11
2016	Lower Support Plate Heat Conductor Surface Area	0	0	- - -	11
2016	LOTIC2 Net Free Volume Direction of Conservatism and Ice Melt Condition	0	0	- - -	11
2016	LOTIC2 Calculation of the Thermodynamic Properties of Air	0	0	- - -	11
2017	General Code Maintenance	0	0	- - -	12
2017	Entrained Liquid / Vapor Interfacial Drag Coefficient Calculation Inconsistency	0	0	- - -	12
2017	Resetting of Transverse Liquid Mass Flow	0	0	- - -	12
2017	Steady State Fuel Temperature Calibration non-Conservatisms	0	0	- - -	12
2018	Vapor Temperature Resetting	0	0	- - -	3
2019	Core Barrel Heat Slab Error	0	0	- - -	2
2019	General Code Maintenance	0	0	- - -	2
2019	Removal of the Vessel Interfacial Heat Transfer Limit	0	0	- - -	2
2021	T_{avg} Window	0	0	1	- - -
- - -	**Updated (net) licensing basis PCT** (AOR PCT + ∑ ΔPCT)	**1711**	- - -	- - -	- - -
- - -	**Cumulative sum of PCT changes** ∑ |ΔPCT|	- - -	**55**	- - -	- - -

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Table 2
Watts Bar Unit 2 SBLOCA

Year	Description	SBLOCA ΔPCT (°F)	SBLOCA |ΔPCT| (°F)	Note	Reference
2010	**SBLOCA AOR PCT**	**1184**	- - -	- - -	7
2014	Cold Leg Accumulator Injection Lines Hydraulic Resistance Changes	0	0	- - -	4
2014	General Computer Code Maintenance	0	0	- - -	9
2014	Fuel Rod Gap Conductance Error	0	0	- - -	9
2014	Radiation Heat Transfer Model Error	0	0	- - -	9
2014	SBLOCTA Pre-DNB Cladding Surface Heat Transfer Coefficient Calculation	0	0	- - -	9
2015	General Computer Code Maintenance	0	0	- - -	10
2015	AFW Temperature Increase During Cold Leg Recirculation	0	0	- - -	10
2016	Plant-Specific Upper Head Geometric Data	0	0	- - -	11
2016	Reduced RWST Useable Volume	0	0	- - -	11
2017	Increased SI injection time delay	0	0	- - -	12
2017	General Code Maintenance	0	0	- - -	12
2017	Upper Plenum Fluid Volume Reduction	0	0	- - -	12
2018	UO_2 Fuel Pellet Heat Capacity	0	0	- - -	3
2021	T_{avg} Window	0	0	2	- - -
- - -	**Updated (net) licensing basis PCT** (AOR PCT + ∑ ΔPCT)	**1184**	- - -	- - -	- - -
- - -	**Cumulative sum of PCT changes** ∑ |ΔPCT|	- - -	**0**	- - -	- - -

Notes:

1. Westinghouse performed an evaluation to support the implementation of a T_{avg} operating range on the LBLOCA analysis. The results showed that the high T_{avg} (588.2°F) condition was limiting compared to the low T_{avg} condition (581.2°F) permitted by the T_{avg} operating range. Therefore, the estimated PCT impact for the T_{avg} window implementation is 0°F.

2. Westinghouse performed an evaluation to support the implementation of T_{avg} operating range on the SBLOCA analysis. The T_{avg} window changed from a nominal 588.2°F to a range of 581.2°F - 588.2°F, and additionally, the evaluation considered ±6°F for T_{avg} uncertainties. The T_{avg} window has been evaluated for the NOTRUMP Evaluation Model (NOTRUMP-EM) SBLOCA analysis basis considering the original steam generators (OSGs). The estimated effect of the T_{avg} window implementation for Watts Bar Unit 2 with the OSGs was qualitatively evaluated to be a 0°F peak cladding temperature impact.

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References:

1. TVA Letter to NRC, WBL-21-009, “10 CFR 50.46 Annual Report for Watts Bar Nuclear Plant Units 1 and 2,” dated March 4, 2021 (ML21063A176)
2. TVA Letter to NRC, WBL-20-007, “10 CFR 50.46 - 30-Day and Annual Report for Watts Bar Nuclear Plant Units 1 and 2,” dated March 5, 2020 (ML20065F821)
3. TVA Letter to NRC, WBL-19-019, “10 CFR 50.46 - 30-Day and Annual Report for Watts Bar Nuclear Plant Units 1 and 2,” dated March 7, 2019 (ML19066A046)
4. TVA letter to NRC, CNL-15-034, “10 CFR 50.46 - 30-Day Report for Watts Bar, Unit 2” dated February 6, 2015 (ML15037A725)
5. TVA letter to NRC, CNL-14-035, “10 CFR 50.46 - 30 day Report for Watts Bar, Units 1 and 2,” dated February 28, 2014 (ML14064A431)
6. WCAP-17093-P, Revision 1, “Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for Watts Bar Unit 2 Nuclear Plant Using the ASTRUM Methodology,” June 2013
7. WBT-D-1460, “Watts Bar Unit 2 (WBT) SBLOCA Analysis: Final Transmittal of Analysis Summary Report,” January 21, 2010
8. TVA letter to NRC, “Watts Bar Nuclear Plant, Unit 2 - Emergency Core Cooling System Evaluation Model Changes - 30 Day Report - 10 CFR 50.46 Notification,” dated August 28, 2013 (ML13246A076)
9. TVA letter to NRC, CNL-15-053, “10 CFR 50.46 - 30-Day and Annual Report for Watts Bar, Units 1 and 2,” dated March 30, 2015 (ML15098A124)
10. TVA letter to NRC, CNL-16-057, “10 CFR 50.46 - Annual Report for Watts Bar Nuclear Plant Units 1 and 2,” dated March 18, 2016 (ML16081A248)
11. TVA Letter to NRC, “10 CFR 50.46 - 30-Day and Annual Report for Watts Bar Nuclear Plant Units 1 and 2,” dated March 8, 2017 (ML17067A079)
12. TVA Letter to NRC, CNL-18-040, “10 CFR 50.46 - 30-Day and Annual Report for Watts Bar Nuclear Plant Units 1 and 2,” dated March 7, 2018 (ML18066A730)