Tennessee Valley Authority, 1101 Market Street, Chattanooga, TN 37402

August 21, 2017

10 CFR 50.4
10 CFR 50.46

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

Watts Bar Nuclear Plant, Unit 1
Facility Operating License NPF-90
NRC Docket No. 50-390

Subject: **10 CFR 50.46 - 30-Day Report for Watts Bar Nuclear Plant Unit 1**

Reference: TVA Letter to NRC, "10 CFR 50.46 - 30-Day and Annual Report for Watts Bar, Units 1 and 2," dated March 8, 2017 (ML17067A079)

The purpose of this letter is to provide the 30-Day Report of changes or errors discovered in the emergency core cooling system (ECCS) evaluation model for Watts Bar Nuclear Plant (WBN) Unit 1. This report is required in accordance with Title 10 of the C*ode of Federal Regulations* (10 CFR) 50.46, "Acceptance Criteria for ECCS for Light-Water Nuclear Power Reactors," paragraph (a)(3)(ii), which states that a holder of an operating license or construction permit is required to report significant changes and errors affecting an ECCS evaluation model to the NRC within 30 days. As defined in 10 CFR 50.46(a)(3)(i),a significant change or affecting an ECCS evaluation model includes the cumulative sum of the absolute magnitudes of resulting peak cladding temperature (PCT) changes exceeding 50°F. This report is the result of an increase in ECCS pump injection delay time and results in a 0°F change in PCT, but because the accumulated changes and errors from previous years are more than 50°F, a 30-day report is required in accordance with 10 CFR 50.46(a)(3)(ii).

The enclosure to this letter provides the 30-day report of significant changes to the WBN, Unit 1 and describes the nature and the estimated effect on the limiting ECCS analysis, of changes or errors discovered since the referenced letter for WBN Unit 1.

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 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. 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 Kimberly Hulvey at (423) 365-7720.

Respectfully,

Paul Simmons
Site Vice President
Watts Bar Nuclear Plant

Enclosure: 10 CFR 50.46 - 30-Day Report for Watts Bar Nuclear Plant Unit 1

cc (Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Watts Bar Nuclear Plant
Division of Radiological Health - State of Tennessee

RDW
Enclosure
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In accordance with the reporting requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.46(a)(3)(ii), the Tennessee Valley Authority (TVA) is providing the following summary of the limiting design basis loss of coolant accident (LOCA) analysis results established using the current Watts Bar Nuclear Plant (WBN) large break LOCA (LBLOCA) Emergency Core Cooling System (ECCS) evaluation model for WBN Unit 1. This report estimates the change in the calculated peak cladding temperature (PCT) since the last analysis of record was submitted to the Nuclear Regulatory Commission (NRC) resulting from an increase in ECCS pump injection delay time.

TVA submitted the last 10 CFR 50.46 annual report for WBN Unit 1 to the NRC on March 8, 2017 (Reference 1).

Table 1 lists the changes and errors in the large break LOCA (LBLOCA) analysis for WBN Unit 1 since the analysis of record (AOR) and the associated estimated effect on PCT. The increase in ECCS pump injection delay time was not previously identified in Reference 1 and is described in the note to Table 1. This change has no effect on the WBN Unit 1 small break LOCA (SBLOCA) analysis nor does it affect WBN Unit 2.

The updated (net) licensing basis PCT for the LBLOCA remains unchanged for WBN Unit 1 from the last annual report.

This report serves as the 30-day report in accordance with 10 CFR 50.46(a)(3)(ii), which states that a holder of an operating license or construction permit is required to report significant changes and errors affecting an ECCS evaluation model to the NRC within 30 days. As defined in 10 CFR 50.46(a)(3)(i),a significant change or affecting an ECCS evaluation model includes the cumulative sum of the absolute magnitudes of resulting peak cladding temperature (PCT) changes exceeding 50°F. 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. The submitted change results in a 0°F change in PCT, but because the previous changes and errors result in more than 50°F change in PCT, a 30-day report is required.

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

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Table 1
Watts Bar Unit 1 LBLOCA

Year	Description	Reflood 1		Reflood 2		Note	Reference
		ΔPCT (°F)	|ΔPCT| (°F)	ΔPCT (°F)	|ΔPCT| (°F)		
1998	**BE LBLOCA AOR PCT**	**1656**	- - -	**1892**	- - -	- - -	2
1999	Vessel Channel DX Error	56	56	-4	4	- - -	3
2000	Increased Accumulator Room Temperature Evaluation	4	4	4	4	- - -	3
2000	1.4% Uprate Evaluation	12	12	12	12	- - -	3
2000	Accumulator Line/Pressurizer Surge Line Data Evaluation	-37	37	-131	131	- - -	3
2000	MONTECF Decay Heat Uncertainty Error	4	4	4	4	- - -	4
2001	WBN Specific LBLOCA Vessel Geometry Input Errors	0	0	0	0	- - -	5
2003	Input Error Resulting in Incomplete Solution Matrix	60	60	0	0	- - -	6
2003	Tavg Bias Error	8	8	8	8	- - -	6
2004	Increased Stroke Time for ECCS Valves	0	0	0	0	- - -	7
2004	Revised Blowdown Heatup Uncertainty Distribution	5	5	5	5	- - -	7
2006	Replacement Steam Generators (D3 to 68AXP)	-50	50	-10	10	- - -	8
2006	HOTSPOT™ Fuel Relocation Error	0	0	65	65	- - -	8

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Table 1
Watts Bar Unit 1 LBLOCA

Year	Description	Reflood 1		Reflood 2		Note	Reference
		ΔPCT (°F)	|ΔPCT| (°F)	ΔPCT (°F)	|ΔPCT| (°F)		
2012	PMID/PBOT Violation Evaluation	20	20	20	20	- - -	9, 10
2012	TCD and Peaking Factor Burndown	114	114	15	15	- - -	9, 10
2013	WCOBRA/TRAC™ History File Dimension Error	0	0	0	0	- - -	11
2013	General Code Maintenance	0	0	0	0	- - -	12
2013	HOTSPOT™ Burst Temperature Calculation for ZIRLO™ Cladding	0	0	0	0	- - -	12
2013	HOTSPOT™ Iteration Algorithm for Calculation Initial Fuel Pellet Average Temperature	0	0	0	0	- - -	12
2013	WCOBRA/TRAC™ Automated Restart Process Logic Error	0	0	0	0	- - -	12
2013	Rod Internal Pressure Calculation Error	0	0	0	0	- - -	12
2013	Elevations for Heat Slab Temperature Initialization	0	0	0	0	- - -	13
2013	Heat Transfer Model Error Corrections	0	0	0	0	- - -	13
2013	Correction to Heat Transfer Node Initialization	0	0	0	0	- - -	13
2013	Mass Conservation Error Fix	0	0	0	0	- - -	13
2013	Correction to Split Channel Momentum Equation	0	0	0	0	- - -	13

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Table 1
Watts Bar Unit 1 LBLOCA

Year	Description	Reflood 1		Reflood 2		Note	Reference
		ΔPCT (°F)	|ΔPCT| (°F)	ΔPCT (°F)	|ΔPCT| (°F)		
2013	Heat Transfer Logic Correction for Rod Burst Calculation	0	0	0	0	- - -	13
2013	Changes to Vessel Superheated Steam Properties	0	0	0	0	- - -	13
2013	Update to Metal Density Reference Temperatures	0	0	0	0	- - -	13
2013	Decay Heat Model Error Corrections	0	0	0	0	- - -	13
2013	Correction to the Pipe Exit Pressure Drop Error	0	0	0	0	- - -	13
2013	WCOBRA/TRAC File Dimension Error Correction	0	0	0	0	- - -	13
2013	Revised Heat Transfer Multiplier Distributions	-40	40	-85	85	- - -	13
2013	HOTSPOT Burst Strain Error	20	20	70	70	- - -	14
2014	General Computer Code Maintenance	0	0	0	0	- - -	15
2014	Revised Uncertainty in LBLOCA Monte Carl Simulations	0	0	0	0	- - -	15
2016	General Code Maintenance	0	0	0	0	- - -	1
2016	Clad Oxidation Calculation	0	0	0	0	- - -	1
2016	LOTIC2 Net Free Volume Direction of Conservatism and Ice Melt Condition	0	0	0	0	- - -	1
2016	LOTIC2 Calculation of the Thermodynamic Properties of Air	0	0	0	0	- - -	1
2016	Increased Safety Injection Time Delay with Offsite Power Available	0	0	0	0	- - -	1

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Year	Description	Reflood 1		Reflood 2		Note	Reference
		ΔPCT (°F)	**|ΔPCT| (°F)**	**ΔPCT (°F)**	**|ΔPCT| (°F)**		
2017	Increase in ECCS pump injection delay time	0	0	0	0	1	- - -
- - -	**Updated (net) licensing basis PCT** AOR PCT + ∑ ΔPCT	**1832**	- - -	**1865**	- - -	- - -	- - -
- - -	**Cumulative sum of PCT changes** ∑ |ΔPCT|	- - -	**430**	- - -	**433**	- - -	- - -

Notes

1. The ECCS injection delay time is an input to the LBLOCA analysis that, in part, determines when injection to the reactor coolant system begins from the ECCS pumps. In the LBLOCA analysis, this time delay was increased to 40 seconds when offsite power is available and to 45 seconds when offsite power is not available to account for the additional time it may take for ECCS pump injection to begin when non-condensable gas is present in the ECCS pump discharge pipe. The resulting total delay time in ECCS injection remains small enough that the limiting LBLOCA scenario is not affected.

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References:

1. TVA letter to NRC, "10 CFR 50.46 - 30-Day and Annual Report for Watts Bar, Units 1 and 2," dated March 8, 2017 (ML17067A079)

2. WCAP-14839, Revision 1, "Best Estimate Analysis of the Large Break Loss of Coolant Accident for the Watts Bar Nuclear Plant," September 1998

3. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 - Emergency Core Cooling System (ECCS) Evaluation Model Changes - 30-Day Report and Annual Notification and Reporting for 2000," dated October 26, 2000 (ML003764646)

4. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 - Emergency Core Cooling System (ECCS) Evaluation Model Changes - 30-Day Report and Revised Annual Notification Report for 2000," dated September 7, 2001 (ML012570290)

5. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 - Emergency Core Cooling System (ECCS) Evaluation Model Changes - Annual Notification and Reporting for 2001," dated April 3, 2002 (ML021070404)

6. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 - Emergency Core Cooling System (ECCS) Evaluation Model Changes - 30-Day Report and Revised Annual Notification and Reporting for 2003," dated April 19, 2004 (ML041130196)

7. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 - Emergency Core Cooling System (ECCS) Evaluation Model Changes - Annual Notification and Reporting for 2004," dated April 19, 2005 (ML051120164)

8. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Unit 1 - Emergency Core Cooling System (ECCS) Evaluation Model Changes - 30-Day Report and Annual Notification and Reporting for 2006," dated July 3, 2007 (ML071860388)

9. TVA letter to NRC, "Supplement to 10 CFR 50.46 - 30-Day Special Report," dated February 13, 2013 (ML13046A002)

10. TVA letter to NRC, "10 CFR 50.46 - 30-Day Special Report," dated October 18, 2012 (ML12296A254)

11. TVA letter to NRC, "10 CFR 50.46 - 30-Day Report for Watts Bar Unit 1," dated March 19, 2013 (ML13080A405)

12. TVA letter to NRC, "10 CFR 50.46 - 30-Day and Annual Report for 2012," dated April 25, 2013 (ML13120A005)

13. TVA letter to NRC, "10 CFR 50.46 - 30 day Report for Watts Bar, Unit 1," dated August 28, 2013 (ML13267A034)

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14. 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)

15. 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)