Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381-2000

April 19, 2004

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

10 CFR 50.46

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

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

References:

(1) TVA letter to NRC, December 18, 2003, "WBN Unit 1 - ECCS Evaluation Model Changes - 30 Day Report and Annual Report"

(2) Westinghouse letter to TVA (WAT-D-11225), March 19, 2004, "Watts Bar Nuclear Plant Units 1 & 2, 10 CFR 50.46 Annual Notification and Reporting for 2003."

(3) TVA letter to NRC, April 3, 2002, "WBN Unit 1 - ECCS Evaluation Model Changes - Annual Notification and Reporting for 2001."

The purpose of this letter is notify the NRC of changes or errors discovered in the WBN ECCS evaluation models for peak cladding temperature (PCT) in accordance with 10 CFR 50.46, and actions TVA has taken to address a temporary change of more than 50°F in calculated PCT. This report includes model changes or errors since TVA's last report (Reference 1), and is intended to satisfy both the 30-day and annual reporting requirements of 10 CFR 50.46.

As reported by Westinghouse in Reference 2, the changes to WBN's ECCS evaluation model affect both the small break LOCA (SBLOCA) analysis and the best estimate large break LOCA (BELOCA) analysis, and are described in Enclosure 1. The PCT margin allocations resulting from these changes are summarized in Enclosure 2. TVA notes there were no additional PCT impacts reported in Reference 2 for SBLOCA from those previously reported in Reference 1. The updated PCT margin allocation sheet for SBLOCA reflects the removal of a temporary 120°F PCT assessment which expired in WBN Cycle 5 and was previously reported in Reference 1.

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As discussed in Enclosure 1, Westinghouse has identified an input value error which affects the BELOCA analysis for WBN. A plant specific calculation was performed for WBN to estimate the PCT effect of this error. It was confirmed that the fundamental LOCA transient characteristics (e.g., blowdown cooling and reflood turnaround timing and behaviors) were unchanged by the error correction. The effect was determined to be +60°F for the first reflood case (Reflood 1), 0°F for the second reflood case, and 0°F for the composite case. In addition, as discussed in Enclosure 1, a Tavg Bias Error of 8°F was assessed for each of these cases. As a result of these model assessments, the most significant change in PCT occurred with the Reflood 1 case (PCT increase of 68°F), with a resulting PCT of 1763°F. This PCT value is below the most recent BELOCA PCT value of 1777°F (Composite) reported in Reference 3. Due to the Tavg Bias Error of 8°F, the resulting BELOCA Composite PCT is 1785°F and remains in compliance with 10 CFR 50.46(b).

The resulting Reflood 1 PCT assessment of 68°F for BELOCA exceeds the threshold defined in 10 CFR 50.46(a)(3)(i) for a change of more than 50°F in calculated PCT. Therefore, TVA is reporting this change within the 30-day time limit specified in 10 CFR 50.46. In accordance with 10 CFR 50.46(a)(3)(ii), TVA is required to provide a proposed schedule for providing a reanalysis or taking other actions needed to show compliance with 50.46 requirements for the changes or errors discussed above. However, this PCT value of 1763°F remains considerably below the 2200°F regulatory limit required by 10 CFR 50.46. Since the Reflood 1 case continues to be less limiting than the Reflood 2 case as reflected by the BELOCA Composite (Enclosure 2) and because the composite case has not changed by more than 50°F since the last BELOCA report (Reference 3), TVA does not propose to provide a best estimate reanalysis at this time. WBN remains in compliance with 10 CFR 50.46(b) requirements, will continue to monitor the periodic reports for significant changes, and will advise the NRC if a future reanalysis is warranted.

Accordingly, TVA has completed the analysis required of 10 CFR 50.46 for changes or errors in the BELOCA ECCS model and no further action is currently required. TVA's commitment to perform an SBLOCA reanalysis as reported in Reference 1 remains valid.

There are no regulatory commitments associated with this submittal.

APR 19 2004

If you have any questions about this change, please contact me at (423) 365-1824.

Sincerely,

P. L. Pace
Manager, Site Licensing
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Enclosures
cc (Enclosures):
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ENCLOSURE 1

DESCRIPTION OF CHANGES WHICH AFFECT WBN'S EMERGENCY CORE COOLING SYSTEM EVALUATION MODEL(S) AND ITS CALCULATION OF PEAK CLADDING TEMPERATURE

1. Input Error Resulting in Incomplete Solution Matrix

Background

Input parameter MSIM identifies the last cell number in each simultaneous solution group for the 3-D vessel component. A survey of WCOBRA/TRAC input decks identified two plant models and one test simulation model in which the MSIM input value was less than the total number of cells in the vessel. This resulted in an incomplete solution matrix. An input diagnostic check has been added to prevent future occurrences. This input correction was determined to be a Non-Discretionary change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Models

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model

Estimated Effect

A plant specific calculation was performed for Watts Bar to estimate the PCT effect of this error. It was confirmed that the fundamental LOCA transient characteristics (e.g., blowdown cooling and reflood turnaround timing and behaviors) were unchanged by the error correction. The reference double-ended guillotine break was used to develop the PCT assessments. The effect is +60°F for the first reflood case and 0°F for the second reflood case.

2. T_{avg} BIAS ERROR

Background

An error has been identified in the Watts Bar Best-Estimate Large Break LOCA (BELOCA) analysis. The Analysis-of-Record for Watts Bar Unit 1 is documented in WCAP-14839 Revision 1. The treatment of the uncertainties for the vessel average temperature (T_{avg}) do not account for a -1.0°F bias that has been established. The -1.0°F bias means that an indicated T_{avg} value could actually be 1.0°F lower than the actual value. Because the actual value could be higher than indicated, and because a higher T_{avg} is more limiting for the calculation of the PCT for the Watts Bar BELOCA, an evaluation was required.

Affected Evaluation Models

1996 Westinghouse BELOCA Evaluation Model

Estimated Effect

In the application of the 1996 BELOCA Evaluation Model, a Monte Carlo simulation is used to calculate the PCT at the 95th percentile. This simulation was re-performed to establish an estimated effect on the PCT. To estimate the change, the nominal value for T_{avg} was increased by 1.0°F. The effect is +8.0°F for both the reflood 1 and reflood 2 time periods. It is judged that the sensitivities calculated with WCOBRA/TRAC for a +1.0°F change would prove sufficiently linear so that the initial condition results (T_{avg} sensitivity) will remain applicable and the estimated effects are therefore appropriate.

ENCLOSURE 2

SUMMARY OF PEAK CLADDING TEMPERATURE MARGIN ALLOCATIONS RESULTING FROM CHANGES TO THE EMERGENCY CORE COOLING SYSTEM EVALUATION MODEL

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 3 /4 /04

Analysis Information

EM:	WCOBRA/TRAC	Analysis Date:	8/1/98	Limiting Break Size:	Guillotine
FQ:	2.5	FdH:	1.65		
Fuel:	Vantage +	SGTP (%):	10		**Composite**
Notes:	Mixed Core - Vantage + / Performance +				

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1892	1,2	
MARGIN ALLOCATIONS (Delta PCT)			
A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS			
1 . Vessel Channel DX Error	-4	3	
2 . MONTECF Decay Heat Uncertainty Error	4	6	
B. PLANNED PLANT CHANGE EVALUATIONS			
1 . Accumulator Line/Pressurizer Surge Line Data Evaluation	-131	4	
2 . Increased Accumulator Temperature Range Evaluation	4	5	
3 . 1.4% Uprate Evaluation	12	5	
C. 2003 PERMANENT ECCS MODEL ASSESSMENTS			
1 . Input Error Resulting in Incomplete Solution Matrix	0	7	
2 . Tavg Bias Error	8	7	
D. TEMPORARY ECCS MODEL ISSUES*			
1 . None	0		
E. OTHER			
1 . None	0		
LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 1785		

* It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

References:

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

2 . WAT-D-10499, "Tennessee Valley Authority Watts Bar Nuclear Plant Units 1 and 2, 10 CFR 50.46 Annual Notification and Reporting for 1997," February 27, 1998.

3 . WAT-D-10618, "Tennessee Valley Authority, Watts Bar Nuclear Plant Units 1 and 2, 10 CFR 50.46 Annual Notification and Reporting for 1998," March 5, 1999.

4 . WAT-D-10725, "Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 1, 10 CFR 50.46 Annual Notification and Reporting for 1999," February 23, 2000.

5 . WAT-D-10840, "Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 1, Final Deliverables for 1.4% Uprate Program," August 31, 2000.

6 . WAT-D-10904, "10 CFR 50.46 Annual Notification and Reporting for 2000," February 2001.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 3 /4 /04

7 . WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 3 /4 /04

Analysis Information

EM:	WCOBRA/TRAC	Analysis Date:	8/1/98	Limiting Break Size:	Guillotine
FQ:	2.5	FdH:	1.65		
Fuel:	Vantage +	SGTP (%):	10		**Reflood 1**
Notes:	Mixed Core - Vantage + / Performance +				

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	**1656**	**1,2**	
MARGIN ALLOCATIONS (Delta PCT)			
A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS			
1 . Vessel Channel DX Error	56	3	
2 . MONTECF Decay Heat Uncertainty Error	4	5	
B. PLANNED PLANT CHANGE EVALUATIONS			
1 . Accumulator Line/Pressurizer Surge Line Data Evaluation	-37	4	
2 . Increased Accumulator Temperature Range Evaluation	4	4	
3 . 1.4% Uprate Evaluation	12	4	
C. 2003 PERMANENT ECCS MODEL ASSESSMENTS			
1 . Input Error Resulting in Incomplete Solution Matrix	60	6	
2 . Tavg Bias Error	8	6	
D. TEMPORARY ECCS MODEL ISSUES*			
1 . None	0		
E. OTHER			
1 . None	0		
LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 1763		

* It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

References:

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

2 . WAT-D-10499, "Tennessee Valley Authority Watts Bar Nuclear Plant Units 1 and 2, 10 CFR 50.46 Annual Notification and Reporting for 1997," February 27, 1998.

3 . WAT-D-10618,"Tennessee Valley Authority, Watts Bar Nuclear Plant Units 1 and 2, 10 CFR 50.46 Annual Notification and Reporting for 1998," March 5, 1999.

4 . WAT-D-10840, "Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 1, Final Deliverables for 1.4% Uprate Program," August 31, 2000.

5 . WAT-D-10904, "10 CFR 50.46 Annual Notification and Reporting for 2000," February 2001.

6 . WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 3 /4 /04

Analysis Information

EM:	WCOBRA/TRAC	Analysis Date:	8/1/98	Limiting Break Size:	Guillotine
FQ:	2.5	FdH:	1.65		
Fuel:	Vantage +	SGTP (%):	10		**Reflood 2**
Notes:	Mixed Core - Vantage + / Performance +				

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1892	1,2	
MARGIN ALLOCATIONS (Delta PCT)			
A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS			
1 . Vessel Channel DX Error	-4	3	
2 . MONTECF Decay Heat Uncertainty Error	4	6	
B. PLANNED PLANT CHANGE EVALUATIONS			
1 . Accumulator Line/Pressurizer Surge Line Data Evaluation	-131	4	
2 . Increased Accumulator Temperature Range Evaluation	4	5	
3 . 1.4% Uprate Evaluation	12	5	
C. 2003 PERMANENT ECCS MODEL ASSESSMENTS			
1 . Input Error Resulting in Incomplete Solution Matrix	0	7	
2 . Tavg Bias Error	8	7	
D. TEMPORARY ECCS MODEL ISSUES*			
1 . None	0		
E. OTHER			
1 . None	0		
LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 1785		

* It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

References:

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

2 . WAT-D-10499, "Tennessee Valley Authority Watts Bar Nuclear Plant Units 1 and 2, 10 CFR 50.46 Annual Notification and Reporting for 1997," February 27, 1998.

3 . WAT-D-10618,"Tennessee Valley Authority, Watts Bar Nuclear Plant Units 1 and 2, 10 CFR 50.46 Annual Notification and Reporting for 1998," March 5, 1999.

4 . WAT-D-10725,"Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 1, 10 CFR 50.46 Annual Notification and Reporting for 1999," February 23, 2000.

5 . WAT-D-10840, "Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 1, Final Deliverables for 1.4% Uprate Program," August 31, 2000.

6 . WAT-D-10904, "10 CFR 50.46 Annual Notification and Reporting for 2000," February 2001.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 3 /4 /04

7 . WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Small Break

Plant Name: Watts Bar Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 3 /4 /04

Analysis Information

EM:	NOTRUMP	**Analysis Date:**	11/1/96	**Limiting Break Size:**	4 inch
FQ:	2.5	**FdH:**	1.65		
Fuel:	Vantage +	**SGTP (%):**	10		
Notes:	Mixed Core - Vantage + / Performance +				

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1126	1,2	
MARGIN ALLOCATIONS (Delta PCT)			
A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS			
1 . NOTRUMP Mixture Level Tracking / Region Depletion Errors	13	4	
B. PLANNED PLANT CHANGE EVALUATIONS			
1 . Annular Blankets	10	3	
C. 2003 PERMANENT ECCS MODEL ASSESSMENTS			
1 . NOTRUMP Bubble Rise / Drift Flux Model Inconsistency Corrections	35	5	
D. TEMPORARY ECCS MODEL ISSUES*			
1 . None	0		
E. OTHER			
1 . Tavg Uncertainty of 6 °F	1		
LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 1185		

* It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

References:

1 . WAT-D-10337, "Tennessee Valley Authority, Watts Bar Nuclear Plant, Final Safety Evaluation to Support Technical Specification Changes," March 5, 1997.

2 . WAT-D-10356, "Tennessee Valley Authority, Watts Bar Nuclear Plant Units 1 & 2, Final Report and Safety Evaluation for the 10% SGTP Program," June 2, 1997.

3 . WAT-D-10618, "Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 1, 10 CFR 50.46 Annual Notification and Reporting for 1998," March 5, 1999.

4 . WAT-D-10810, "Tennessee Valley Authority, Watts Bar Nuclear Plant Unit 1, 10 CFR 50.46 Appendix K (BART/BASH/NOTRUMP) Evaluation Model Mid-Year Notification and Reporting for 2000," June 30, 2000.

5 . WAT-D-11195, "10 CFR 50.46 Mid-Year Notification and Reporting for 2003," November 2003.

Notes:

None