



Tennessee Valley Authority
1101 Market Street, LP 3R
Chattanooga, Tennessee 37402-2801

R. M. Krich
Vice President
Nuclear Licensing

December 21, 2010

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 No. NPF-90
NRC Docket No. 50-390

Subject: 10 CFR 50.46 Annual Report for Model Year 2009

Reference: TVA Letter to NRC, "Watts Bar Nuclear Plant Unit 1 - Emergency Core Cooling System Evaluation Model Changes - Annual Notification and Reporting," dated December 30, 2009

The purpose of this letter is to provide the annual report of changes or errors discovered in the emergency core cooling system (ECCS) evaluation model for Watts Bar Nuclear Plant, Unit 1. In accordance with 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems (ECCS) for Light-Water Nuclear Power Reactors," paragraph (a)(3)(ii), the enclosed report describes the nature and the estimated effect on the limiting ECCS analysis of changes or errors discovered since submittal of the reference letter.

There are no regulatory commitments in this letter. Please direct questions concerning this issue to Michael Brandon at (423) 365-1824.

Respectfully,

R. M. Krich

Enclosure: 10 CFR 50.46 Annual Report

cc (Enclosure): NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Watts Bar Nuclear Plant

A002
LRC

**WATTS BAR NUCLEAR PLANT
UNIT 1**

10 CFR 50.46 ANNUAL REPORT

1. 1985 WESTINGHOUSE SMALL BREAK LOCA EVALUATION MODEL WITH NOTRUMP

There were no changes, error corrections, or enhancements to the 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP. Therefore, there is no associated reporting text related to the 1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP for 2009.

2. GENERAL CODE MAINTENANCE (Discretionary Change)

Background

Various changes have been made to enhance the usability of codes and to streamline future analyses. Examples of these changes include modifying input variable definitions, units and defaults; improving the input diagnostic checks; enhancing the code output; optimizing active coding; and eliminating inactive coding. These changes represent Discretionary Changes that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
1999 Westinghouse Best Estimate Large Break LOCA Evaluation Model, Application to PWRs with Upper Plenum Injection
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

The nature of these changes leads to an estimated PCT impact of 0°F.

3. ERROR IN ASTRUM PROCESSING OF AVERAGE ROD BURNUP AND ROD INTERNAL PRESSURE (Non-Discretionary Change)

Background

An error was discovered in the processing of the burnup and rod internal pressure inputs for average core rods in ASTRUM analyses. The correction of this error has been evaluated for impact on current licensing-basis analyses and will be incorporated into the ASTRUM method at a future time. These changes represent a closely-related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

This error was evaluated to have a negligible impact on PCT, leading to an estimated impact of 0°F for 10 CFR 50.46 reporting purposes.

4. DISCREPANCY IN METAL MASSES USED FROM DRAWINGS (Non-Discretionary Changes)

Background

Discrepancies were discovered in the use of lower support plate (LSP) metal masses from drawings. The updated LSP metal masses have been evaluated for impact on current licensing-basis analysis results and will be incorporated on a forward-fit basis. This change represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

SECY UPI WCOBRA/TRAC Large Break LOCA Evaluation Model
1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
1999 Westinghouse Best Estimate Large Break LOCA Evaluation Model, Application to PWRs with Upper Plenum Injection
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

The lower support plate mass error is relatively minor and would be expected to have a negligible effect on the Large Break LOCA analysis results, leading to an estimated PCT impact of 0°F for 10 CFR 50.46 reporting purposes.

5. HOTSPOT GAP HEAT TRANSFER LOGIC (Non-Discretionary Change)

Background

The HOTSPOT code has been updated to incorporate the following changes to the gap heat transfer logic: (1) change the gap temperature from the pellet average temperature to the average of the pellet outer surface and cladding inner surface temperatures; (2) correct the calculation of the pellet surface emissivity to use a temperature in °R (as specified in Equation 7-28 of Reference 1) instead of °F; and (3) revise the calculation of the gap radiation heat transfer coefficient to delete a term and temperature adder not shown in or suggested by Equation 7-28 of Reference 1. These changes represent a closely-related group of Non-Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
1999 Westinghouse Best Estimate Large Break LOCA Evaluation Model, Application to PWRs with Upper Plenum Injection
2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

Estimated Effect

Sample calculations showed a minimal impact on PCT, leading to an estimated effect of 0°F.

Reference

1. WCAP-12945-P-A, Volume 1, Revision 2, "Code Qualification Document for Best Estimate LOCA Analysis, Volume I: Models and Correlations," March 1998.

6. HOTSPOT STATISTICAL OUTPUT LOGIC (Non-Discretionary Change)

Background

The HOTSPOT code has been updated to incorporate the following changes to the statistical output logic for calculations using the Code Qualification Document methodology: (1) revise one of the three methods for calculating the standard deviation of cladding temperature to correctly identify the bin containing the 97.5th percentile value; and (2) change the 50th, 95th and 97.5th percentile bin values from the lower end of the range to the upper end. These changes represent a closely-related group of Non- Discretionary Changes in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model
1999 Westinghouse Best Estimate Large Break LOCA Evaluation Model, Application to PWRs with Upper Plenum Injection

Estimated Effect

Sample calculations suggested a minimal impact on the 95th percentile PCT, leading to an estimated effect of 0°F.

7. WAT CYCLE 10 PMID VIOLATION

Background

The Watts Bar Unit 1 Cycle 10 reload core design resulted in several violations of the PMID limit used in the Large Break LOCA Analysis. These violations were evaluated for Watts Bar, Unit 1 Cycle 10 operation. This change represents a Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

Affected Evaluation Model(s)

1996 Westinghouse Best Estimate Large Break LOCA Evaluation Model

Estimated Effect

The impact of the PMID violation for Watts Bar Unit 1 Cycle 10 was determined via a plant-specific evaluation to be 20°F for Reflood 1 and Reflood 2.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority

Revision Date: 01/27/2010

Cycle 9, RSG

Composite

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/1998
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage + **SGTP (%):** 12
Notes: Mixed Core - Vantage + / Performance + / RFA-2

Limiting Break Size: Guillotine

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1892	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	-4	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	0	7	
4. Tavg Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	65	11	
B. PLANNED PLANT MODIFICATION 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	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-10	10	
6. PMID Violation Evaluation	20	12	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1865		

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar Unit 1
Utility Name: Tennessee Valley Authority

Cycle 9, RSG

Revision Date: 01/27/2010

Composite

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.
12. LTR-LIS-07-893, "10 CFR 50.46 Reporting Text for Watts Bar Unit 1 Cycle 9 RSAC PMID Violation Evaluation and Revised PCT Rackup Sheets," December 2007.

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: 01/27/2010

Cycle 9, RSG

Reflood 1

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/1998
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage + **SGTP (%):** 12
Notes: Mixed Core - Vantage + / Performance + / RFA-2

Limiting Break Size: Guillotine

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1656	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	56	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	60	7	
4. Tavg Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	0	11	
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. Accumulator Line/Pressurizer Surge Line Data Evaluation	-37	4	
2. Increased Accumulator Temperature Range Evaluation	4	5	
3. 1.4% Uprate Evaluation	12	5	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-50	10	
6. PMID Violation Evaluation	20	12	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT =	1738	

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority

Cycle 9, RSG

Revision Date: 01/27/2010

Reflow 1

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.
12. LTR-LIS-07-893, "10 CFR 50.46 Reporting Text for Watts Bar Unit 1 Cycle 9 RSAC PMID Violation Evaluation and Revised PCT Rackup Sheets," December 2007.

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: 01/27/2010

Cycle 9, RSG
Reflow 2

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/1998
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage +
Notes: Mixed Core - Vantage + / Performance + / RFA-2

Limiting Break Size: Guillotine

SGTP (%): 12

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1892	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	-4	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	0	7	
4. Tavg Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	65	11	
B. PLANNED PLANT MODIFICATION 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	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-10	10	
6. PMID Violation Evaluation	20	12	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1865		

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1

Utility Name: Tennessee Valley Authority

Revision Date: 01/27/2010

Cycle 9, RSG

Reflow 2

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.
12. LTR-LIS-07-893, "10 CFR 50.46 Reporting Text for Watts Bar Unit 1 Cycle 9 RSAC PMID Violation Evaluation and Revised PCT Rackup Sheets," December 2007.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority

Cycle 10, RSG

Revision Date: 02/04/2010

Composite

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.
12. LTR-LIS-10-118, "10 CFR 50.46 Reporting Text for Watts Bar Unit 1 Cycle 10 RSAC PMID Violation Evaluation and Revised PCT Rackup Sheets," February 2010.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority

Cycle 10, RSG

Reflood 1

Revision Date: 02/04/2010

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/1998 **Limiting Break Size:** Guillotine
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage + **SGTP (%):** 12
Notes: Mixed Core - Vantage + / Performance + / RFA-2

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1656	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	56	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	60	7	
4. Tavg Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	0	11	
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. Accumulator Line/Pressurizer Surge Line Data Evaluation	-37	4	
2. Increased Accumulator Temperature Range Evaluation	4	5	
3. 1.4% Uprate Evaluation	12	5	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-50	10	
6. PMID Violation Evaluation	20	12	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1738		

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority

Cycle 10, RSG

Revision Date: 02/04/2010

Reflow 1

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.
12. LTR-LIS-10-118, "10 CFR 50.46 Reporting Text for Watts Bar Unit 1 Cycle 10 RSAC PMID Violation Evaluation and Revised PCT Rackup Sheets," February 2010.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority

Cycle 10, RSG

Reflood 2

Revision Date: 02/04/2010

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/2009 **Limiting Break Size:** Guillotine
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage + **SGTP (%):** 12
Notes: Mixed Core - Vantage + / Performance + / RFA-2

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1892	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	-4	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	0	7	
4. Tavg Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	65	11	
B. PLANNED PLANT MODIFICATION 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	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-10	10	
6. PMID Violation Evaluation	20	12	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1865		

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority

Cycle 10, RSG

Revision Date: 02/04/2010

Reflood 2

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.
12. LTR-LIS-10-118, "10 CFR 50.46 Reporting Text for Watts Bar Unit 1 Cycle 10 RSAC PMID Violation Evaluation and Revised PCT Rackup Sheets," February 2010.

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: 01/27/2010

RSG
Composite

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/1998 **Limiting Break Size:** Guillotine
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage + **SGTP (%):** 12
Notes: Mixed Core - Vantage + / Performance + / RFA-2

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1892	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	-4	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	0	7	
4. Tavq Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	65	11	
B. PLANNED PLANT MODIFICATION 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	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-10	10	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1845		

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 01/27/2010

RSG Composite

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.

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: 01/27/2010

RSG
Reflow 1

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/1998 **Limiting Break Size:** Guillotine
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage + **SGTP (%):** 12
Notes: Mixed Core - Vantage + / Performance + / RFA-2

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1656	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	56	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	60	7	
4. Tavg Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	0	11	
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. Accumulator Line/Pressurizer Surge Line Data Evaluation	-37	4	
2. Increased Accumulator Temperature Range Evaluation	4	5	
3. 1.4% Uprate Evaluation	12	5	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-50	10	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1718		

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1

Utility Name: Tennessee Valley Authority

Revision Date: 01/27/2010

RSG

Reflow 1

References (continued)

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.

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: 01/27/2010

RSG
Reflood 2

Analysis Information

EM: CQD (1996) **Analysis Date:** 8/1/1998 **Limiting Break Size:** Guillotine
FQ: 2.5 **FdH:** 1.65
Fuel: Vantage + **SGTP (%):** 12
Notes: Mixed Core - Vantage + / Performance + / RFA-2

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1892	1, 2	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. Vessel Channel DX Error	-4	3	
2. MONTECF Decay Heat Uncertainty Error	4	6	
3. Input Error Resulting in Incomplete Solution Matrix	0	7	
4. Tavg Bias Error	8	7	
5. Revised Blowdown Heatup Uncertainty Distribution	5	8	
6. HOTSPOT Fuel Relocation Error	65	11	
B. PLANNED PLANT MODIFICATION 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	
4. Increased Stroke Time for the ECCS Valves	0	9	
5. Replacement Steam Generators (D3 to 68AXP)	-10	10	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1845		

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.

Westinghouse LOCA Peak Clad Temperature Summary for Best Estimate Large Break

Plant Name: Watts Bar, Unit 1
Utility Name: Tennessee Valley Authority
Revision Date: 01/27/2010

RSG
Reflood 2

References (Continued):

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.
7. WAT-D-11225, "10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
8. WAT-D-11334, "10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
9. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
10. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
11. LTR-LIS-07-378, "10 CFR 50.46 Reporting Text for HOTSPOT Fuel Relocation Error and Revised PCT Rackup Sheets for Watts Bar Unit 1," June 2007.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break

RSG

Plant Name: Watts Bar, Unit 1

Utility Name: Tennessee Valley Authority

Revision Date: 01/27/2010

Analysis Information

EM: NOTRUMP

Analysis Date: 5/17/2004

Limiting Break Size: 4 inch

FQ: 2.5

FdH: 1.65

Fuel: RFA-2

SGTP (%): 12

Notes: Mixed Core - Vantage + / Performance + / RFA-2

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1132	1	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. Increased Stroke Time for the ECCS Valves	0	2	
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. Leaking SIS Relief Valve	120	3	
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1252		

References:

1. WTV-RSG-06-015, "LOCA & Non-LOCA Analysis Summary for Replacement Steam Generator," February 2006.
2. WAT-D-11285, "Evaluation of Proposed Changes to the Stroke Time for the ECCS Valves," November 2004.
3. WAT-D-11360, "Safety Injection Pump Discharge Relief Valve Leakage Evaluation," July 2005.

Notes:

None

Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break

Future

Plant Name: Watts Bar, Unit 2

Utility Name: Tennessee Valley Authority

Revision Date: 01/27/2010

Analysis Information

EM: ASTRUM (2004)

Analysis Date: 10/14/2009

Limiting Break Size: Split

FQ: 2.5

FdH: 1.65

Fuel: RFA-2

SGTP (%): 10

Notes:

	Clad Temp (°F)	Ref.	Notes
LICENSING BASIS			
Analysis-Of-Record PCT	1552	1	
PCT ASSESSMENTS (Delta PCT)			
A. PRIOR ECCS MODEL ASSESSMENTS			
1. None	0		
B. PLANNED PLANT MODIFICATION EVALUATIONS			
1. None	0		
C. 2009 ECCS MODEL ASSESSMENTS			
1. None	0		
D. OTHER*			
1. None	0		
LICENSING BASIS PCT + PCT ASSESSMENTS	PCT = 1552		

References:

1. WCAP-17093-P, Revision 0, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for Watts Bar Unit 2 Nuclear Power Plant Using the ASTRUM Methodology," December 2009.

Notes:

None