



March 26, 2018

L-2018-063
10 CFR 50.46

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

Re: Florida Power & Light Company
Turkey Point Units 3 and 4, Docket Nos. 50-250, 50-251

Florida Power & Light Company
St. Lucie Units 1 and 2, Docket Nos. 50-335, 50-389

NextEra Energy Seabrook, LLC
Seabrook Station, Docket No. 50-443

NextEra Energy Duane Arnold, LLC
Duane Arnold Energy Center, Docket No. 50-331

NextEra Energy Point Beach, LLC
Point Beach Units 1 and 2, Docket Nos. 50-266, 50-301

10 CFR 50.46 Annual Reporting and 30-day Notification of Changes or Errors in
Emergency Core Cooling System Models or Applications

Pursuant to 10 CFR 50.46(a)(3)(ii), this letter contains as an attachment, the annual summaries of the nature of any changes or errors discovered in the evaluation models for emergency core cooling systems (ECCS), or in the application of such models, that affect the fuel cladding temperature calculations for Florida Power & Light's Turkey Point Nuclear Plant, Units 3 and 4; St. Lucie Nuclear Plant, Units 1 and 2; NextEra Energy Seabrook Station; NextEra Energy Duane Arnold; and NextEra Energy Point Beach Nuclear Plant, Units 1 and 2. The estimated effect from any such change or error on the limiting ECCS analysis for each unit is also addressed. The data interval for this report is from January 1, 2017 through December 31, 2017.

In addition to the annual reporting, this letter also contains the 30-day report for the Turkey Point Nuclear Plant (PTN), Units 3 and 4, Seabrook Station (SBK), and Point Beach Nuclear Plant (PBNP), Units 1 and 2 for the emergency core cooling system (ECCS) analysis performed by Westinghouse Electric Company, LLC, in the respective attachments to this letter. Evaluations of each reported error have concluded that re-analysis was not required.

This letter contains no new or revised regulatory commitments.

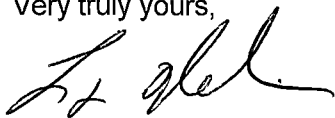
Should you have any questions regarding this report, please contact Mr. Steve Catron, Fleet Licensing Manager, at (561) 304-6206.

Florida Power & Light Company

700 Universe Boulevard, Juno Beach, FL 33408

ADDZ
NRR

Very truly yours,



Larry Nicholson
Director, Nuclear Licensing and Regulatory Compliance
Florida Power & Light Company

Attachments (5)

cc: USNRC Regional Administrator, Region I
USNRC Regional Administrator, Region II
USNRC Regional Administrator, Region III

USNRC Project Manager, Seabrook Station
USNRC Project Manager, St. Lucie Nuclear Plant
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Project Manager, Duane Arnold Energy Center
USNRC Project Manager, Point Beach Nuclear Plant

USNRC Senior Resident Inspector, Seabrook Station
USNRC Senior Resident Inspector, St. Lucie Nuclear Plant
USNRC Senior Resident Inspector, Turkey Point Nuclear Plant
USNRC Senior Resident Inspector, Duane Arnold Energy Center
USNRC Senior Resident Inspector, Point Beach Nuclear Plant

ATTACHMENT 1

**Florida Power & Light Company
Turkey Point Units 3 and 4**

Table 1: Turkey Point Unit 3 & 4 Small Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Westinghouse, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A, August 1985 and Addendum 2, Revision 1, July 1997.

Evaluation Model PCT: 1231 °F (Reference 1)

		Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to 12/31/2016 (Reference 2)		0 °F	0 °F
10 CFR 50.46 Changes or Errors Corrections – year 2017			
	Error in Vessel Average Temperature Uncertainty (Reference 3)	0 °F	0 °F
	Error in the Upper Plenum Fluid Volume	0 °F	0 °F
Sum of 10 CFR 50.46 Changes or Errors Corrections		0 °F	0 °F

<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	1231 °F < 2200 °F
--	-----------------------------

Error in the Upper Plenum Fluid Volume Calculation

An error was found in the fluid volume calculation in the upper plenum where the support column outer diameter was being used instead of the inner diameter. The corrected values represent a less than 1% change in the total RCS fluid volume. The estimated PCT impact is 0 °F.

References:

1. Letter from M. Kiley to U.S. Nuclear Regulatory Commission, "License Amendment Request for Expedited Power Uprate (LAR 205)," L-2010-113, October 21, 2010.
2. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Reporting of Changes to, or Errors in Emergency Core Cooling System Models or Applications," L-2017-014, April 17, 2017.
3. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 – Emergency Core Cooling 30-Day Report," L-2017-102, June 2, 2017.

Table 2: Turkey Point Unit 3 & 4 Large Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Westinghouse, “Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Of Uncertainty Method (ASTRUM),” WCAP-16009-P-A, Revision 0, January 2005.

Evaluation Model PCT: 2152 °F (Reference 1)

	Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to 12/31/2016 (Reference 2)	-28 °F	80 °F
10 CFR 50.46 Changes or Errors Corrections – year 2017		
Error in Vessel Average Temperature Uncertainty (Reference 3)	0 °F	0 °F
Sum of 10 CFR 50.46 Changes or Errors Corrections	-28 °F	80 °F

<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	2124 °F < 2200 °F
--	-----------------------------

References:

1. Letter from M. Kiley to U.S. Nuclear Regulatory Commission, “Response to NRC Reactor Systems Branch Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Thermal Conductivity Degradation,” L-2012-019, January 16, 2012.
2. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, “10 CFR 50.46 Annual Reporting of Changes to, or Errors in Emergency Core Cooling System Models or Applications,” L-2017-014, April 17, 2017.
3. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, “10 CFR 50.46 – Emergency Core Cooling 30-Day Report,” L-2017-102, June 2, 2017.

Table 3: Turkey Point Unit 3 & 4 Large Break LOCA PCT 30-Day Report

Evaluation Methodology:

Westinghouse, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment Of Uncertainty Method (ASTRUM)," WCAP-16009-P-A, Revision 0, January 2005.

Evaluation Model PCT: 2152 °F (Reference 1)

		Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to year 2017 (Attachment 1, Table 2)		-28 °F	80 °F
Prior 10 CFR 50.46 Changes or Errors Corrections – year 2018		None	
New 10 CFR 50.46 Changes or Errors Corrections – year 2018			
	Inconsistent Application of Numerical Ramp Applied to the Entrained Liquid / Vapor Interfacial Drag Coefficient	0 °F	0 °F
	Inappropriate Resetting of Transverse Liquid Mass Flow	0 °F	0 °F
	Steady-State Fuel Temperature Calibration Method	0 °F	0 °F
Sum of 10 CFR 50.46 Changes or Errors Corrections		-28 °F	80 °F

<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	2124 °F < 2200 °F
--	-----------------------------

References:

1. Letter from M. Kiley to U.S. Nuclear Regulatory Commission, "Response to NRC Reactor Systems Branch Request for Additional Information Regarding Extended Power Uprate License Amendment Request No. 205 and Thermal Conductivity Degradation," L-2012-019, January 16, 2012.

Turkey Point Unit 3 & 4 Large Break LOCA PCT 30-Day Report

Inconsistent Application of Numerical Ramp Applied to the Entrained Liquid / Vapor Interfacial Drag Coefficient

A numerical ramp which was used to account for the disappearance of the entrained liquid phase was applied to the entrained liquid / vapor interfacial drag coefficient. The numerical ramp was applied such that the interfacial drag coefficient used in the solution of the entrained liquid and vapor momentum equations was not consistent. WCOBRA/TRAC was updated to apply the numerical ramp prior to usage of the interfacial drag coefficient in the momentum equations, such that a consistent interfacial drag coefficient was used in the entrained liquid and vapor momentum equations.

The PCT impact of the error is estimated to be 0 °F.

Inappropriate Resetting of Transverse Liquid Mass Flow

In the WCOBRA/TRAC routine which evaluates the mass and energy residual error of the time step solution, the transverse liquid mass flow is reset as the liquid phase disappears. The routine is updated to remove the resetting of the transverse liquid mass flow since the routine is to only evaluate the residual error based on the time step solution values.

The PCT impact of the error is estimated to be 0 °F.

Steady-State Fuel Temperature Calibration Method

In the Automated Statistical Treatment of Uncertainty Method (ASTRUM) Best-Estimate (BE) Large-Break Loss-of-Coolant Accident (LBLOCA) Evaluation Model (EM), the steady-state fuel pellet temperature calibration method involves solving for the hot gap width (AGFACT) to calibrate the fuel temperature for each fuel rod. In some infrequent situations, small non-conservatism can occur in the calibration process such that the resulting fuel pellet temperature will be slightly lower than intended and outside the acceptable range defined by Table 12-6 of WCAP-16009-P/NP-A.

A review of licensing basis analyses concluded that the potential non-conservatism in the fuel pellet temperature calibration did not occur for the limiting analysis cases. Therefore, the PCT impact is 0°F.

ATTACHMENT 2

**Florida Power & Light Company
St. Lucie Units 1 and 2**

Table 1: St. Lucie Unit 1 Small Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Framatome, “PWR Small Break LOCA Evaluation Model, S-RELAP5 Based,” EMF-2328(P)(A) Revision 0 as supplemented by ANP-3000(P), Revision 0.

Evaluation Model PCT: 1828°F

		Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to Year 2016 (Reference 1)		+22 °F	82 °F
10 CFR 50.46 Changes or Error Corrections – Year 2017			
	SRM Model Update due to new rupture test data (Reference 2)	0 °F	0 °F
	Error in oxidation calculations due to high temperature metal-water reaction (Reference 3)	+2 °F	2 °F
Sum of 10 CFR 50.46 Changes or Error Corrections		+24 °F	84 °F
The sum of <i>the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>		1852 °F < 2200 °F	

References:

1. Letter L-2017-056, “10 CFR 50.46 Annual Report,” 3/27/2017 (ML17086A321).
2. Letter L-2017-157, “10 CFR 50.46 30-Day Report,” 9/1/2017 (ML17258A037).
3. Letter L-2018-005, “10 CFR 50.46 – Emergency Core Cooling 30-Day Report,” 1/12/2018 (ML18017A232).

Table 2: St. Lucie Unit 1 Large Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Framatome, "Realistic Large Break LOCA Methodology for Pressurized Water Reactors," EMF-2103(P)(A) Revision 0 as supplemented by ANP-2903(P), Revision 1.

Evaluation Model PCT: 1788°F

	Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to Year 2016 (Reference 1)	+6 °F	6°F
10 CFR 50.46 Changes or Error Corrections – Year 2017	None	None
Sum of 10 CFR 50.46 Changes or Error Corrections	+6 °F	6°F
<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	1794 °F < 2200 °F	

References:

1. Letter L-2017-056, "10 CFR 50.46 Annual Report," 3/27/2017 (ML17086A321).

Table 3: St. Lucie Unit 2 Small Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Framatome, "PWR Small Break LOCA Evaluation Model, S-RELAP5 Based," EMF-2328(P)(A) Revision.0.

Evaluation Model PCT: 2057°F

	Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to Year 2016 (Reference 1)	0 °F	0 °F
10 CFR 50.46 Changes or Error Corrections – Year 2017		
SRM Model Update due to new rupture test data (Reference 2)	0 °F	0 °F
Error in oxidation calculations due to high temperature metal-water reaction (Reference 2)	+57 °F	57 °F
Change in analysis HPSI flow assumption (Reference 2)	-336 °F	336 °F
Sum of 10 CFR 50.46 Changes or Error Corrections	-279°F	393 °F
The sum of <i>the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>		1778 °F < 2200 °F

References:

1. Letter L-2017-056, "10 CFR 50.46 Annual Report," 3/27/2017 (ML17086A321).
2. Letter L-2018-005, "10 CFR 50.46 – Emergency Core Cooling 30-Day Report," 1/12/2018 (ML18017A232).

Table 4: St. Lucie Unit 2 Large Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Framatome, "Realistic Large Break LOCA Methodology for Pressurized Water Reactors," EMF-2103(P)(A) Revision 0.

Evaluation Model PCT: 1732°F

	Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to Year 2016 (Reference 1)	0 °F	0 °F
10 CFR 50.46 Changes or Error Corrections – Year 2017	None	None
Sum of 10 CFR 50.46 Changes or Error Corrections	0 °F	0 °F
<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	1732 °F < 2200 °F	

References:

1. Letter L-2017-056, "10 CFR 50.46 Annual Report," 3/27/2017 (ML17086A321).

ATTACHMENT 3

**NextEra Energy
Seabrook Station**

Table 1: Seabrook Unit 1 Small Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Westinghouse, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A, August 1985 and Addendum 2, Revision 1, July 1997.

Evaluation Model PCT: 1373 °F (Reference 1)

	Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to 12/31/2016 (Reference 2)	0 °F	0 °F
10 CFR 50.46 Changes or Errors Corrections – year 2017		
Error in Vessel Average Temperature Uncertainty (Reference 3)	0 °F	0 °F
Error in the Upper Plenum Fluid Volume	0 °F	0 °F
Sum of 10 CFR 50.46 Changes or Errors Corrections	0 °F	0 °F

<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	1373 °F < 2200 °F
--	-----------------------------

Error in the Upper Plenum Fluid Volume Calculation:

An error was found in the fluid volume calculation in the upper plenum where the support column outer diameter was being used instead of the inner diameter. The corrected values represent a less than 1% change in the total RCS fluid volume. The estimated PCT impact is 0 °F.

References:

1. Letter from M. Warner to U.S. Nuclear Regulatory Commission, "License Amendment Request 04-03, Application for Stretch Power Uprate," NYN-04016, March 17, 2004.
2. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Reporting of Changes to, or Errors in Emergency Core Cooling System Models or Applications," L-2017-014, April 17, 2017.
3. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 – Emergency Core Cooling 30-Day Report," L-2017-102, June 2, 2017.

Table 2: Seabrook Unit 1 Large Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Westinghouse, "Code Qualification Document for Best Estimate LOCA Analysis," WCAP-12945-P-A, March 1998.

Evaluation Model PCT: 1784 °F (Reference 1)

	Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to 12/31/2016 (Reference 2)	155 °F	155 °F
10 CFR 50.46 Changes or Errors Corrections – year 2017		
Error in Vessel Average Temperature Uncertainty (Reference 3)	0 °F	0 °F
Sum of 10 CFR 50.46 Changes or Errors Corrections	155 °F	155 °F

<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	1939 °F < 2200 °F
--	-----------------------------

References:

1. Letter from M. Warner to U.S. Nuclear Regulatory Commission, "License Amendment Request 04-03, Application for Stretch Power Uprate," NYN-04016, March 17, 2004.
2. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Reporting of Changes to, or Errors in Emergency Core Cooling System Models or Applications," L-2017-014, April 17, 2017.
3. Letter from L. Nicholson to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 – Emergency Core Cooling 30-Day Report," L-2017-102, June 2, 2017.

Table 3: Seabrook Unit 1 Large Break LOCA PCT 30-Day Report

Evaluation Methodology:

Westinghouse, "Code Qualification Document for Best Estimate LOCA Analysis," WCAP-12945-P-A, March 1998.

Evaluation Model PCT: 1784 °F (Reference 1)

		Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to year 2017 (Attachment 3, Table 2)		155 °F	155 °F
Prior 10 CFR 50.46 Changes or Errors Corrections – year 2018		None	
New 10 CFR 50.46 Changes or Errors Corrections – year 2018			
	Inconsistent Application of Numerical Ramp Applied to the Entrained Liquid / Vapor Interfacial Drag Coefficient	0 °F	0 °F
	Inappropriate Resetting of Transverse Liquid Mass Flow	0 °F	0 °F
Sum of 10 CFR 50.46 Changes or Errors Corrections		155 °F	155 °F

<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	1939 °F < 2200 °F
--	-----------------------------

References:

1. Letter from M. Warner to U.S. Nuclear Regulatory Commission, "License Amendment Request 04-03, Application for Stretch Power Uprate," NYN-04016, March 17, 2004.

Seabrook Unit 1 Large Break LOCA PCT 30-Day Report

Inconsistent Application of Numerical Ramp Applied to the Entrained Liquid / Vapor Interfacial Drag Coefficient

A numerical ramp which was used to account for the disappearance of the entrained liquid phase was applied to the entrained liquid / vapor interfacial drag coefficient. The numerical ramp was applied such that the interfacial drag coefficient used in the solution of the entrained liquid and vapor momentum equations was not consistent. WCOBRA/TRAC was updated to apply the numerical ramp prior to usage of the interfacial drag coefficient in the momentum equations, such that a consistent interfacial drag coefficient was used in the entrained liquid and vapor momentum equations.

The PCT impact of the error is estimated to be 0 °F.

Inappropriate Resetting of Transverse Liquid Mass Flow

In the WCOBRA/TRAC routine which evaluates the mass and energy residual error of the time step solution, the transverse liquid mass flow is reset as the liquid phase disappears. The routine is updated to remove the resetting of the transverse liquid mass flow since the routine is to only evaluate the residual error based on the time step solution values.

The PCT impact of the error is estimated to be 0 °F.

ATTACHMENT 4

**NextEra Energy
Duane Arnold**

Table 1: Duane Arnold GNF2 LOCA PCT 2017 Annual Report

Evaluation Methodology:

General Electric, “The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident: Volume III – SAFER/GESTR Application Methodology,” NEDE-23785-1-PA, February 1985.

Global Nuclear Fuel, Licensing Topical Report, “The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance,” Technical Bases - NEDC-33256P-A, Qualification - NEDC-33257P-A, and Application Methodology - NEDC-33258P-A, September 2010.

General Electric-Hitachi, “Duane Arnold Energy Center GNF2 ECCS-LOCA Evaluation,” Engineering Report #0000-0133-6901-R0, DRF 0000-0133-6885-R0, August 2012.

Evaluation Model PCT: **1730 °F**

	Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to 12/31/2016 (Reference 1)	10 °F	50 °F
10 CFR 50.46 Changes or Error Corrections – 2017		
1. Impact of modeling forward and backward leakage paths through the bottom of the fuel bundle (Reference 2)	-20 °F	20 °F
2. Impact of new inputs for fuel rod plenum temperature modeling (Reference 3)	0 °F	0 °F
Sum of 10 CFR 50.46 Changes or Errors Corrections	-10 °F	70 °F
<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	1720 °F < 2200 °F	

References:

1. Letter from L. Nicholson (Florida Power & Light Company) to USNRC, “10 CFR 50.46 Annual Reporting of Changes to, or Errors in Emergency Core Cooling System Models or Applications,” L-2017-014, April 17, 2017.
2. Letter from L. Nicholson (Florida Power & Light Company) to USNRC, “10 CFR 50.46 30-Day Special Report of Changes in Peak Cladding Temperature for the Duane Arnold Energy Center,” L-2017-118, June 28, 2017.
3. Letter from L. Nicholson (Florida Power & Light Company) to USNRC, “10 CFR 50.46 30-Day Special Report of Changes in Peak Cladding Temperature for the Duane Arnold Energy Center,” L-2017-145, August 28, 2017.

ATTACHMENT 5

**NextEra Energy
Point Beach Units 1 and 2**

Table 1: Point Beach Units 1 and 2 Small Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Westinghouse, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A, August 1985 and Addendum 2, Revision 1, July 1997.

Evaluation Model PCT (Unit 1/Unit 2): 1049°F/1103°F

		Net PCT Effect	Absolute PCT Effect
Prior 10 CFR 50.46 Changes or Error Corrections – up to Year 2016 (Reference 1)		0°F/0°F	0°F/0°F
10 CFR 50.46 Changes or Error Corrections – Year 2017			
	Error in the Upper Plenum fluid volume	0°F/0°F	0°F/0°F
Sum of 10 CFR 50.46 Changes or Error Corrections		0°F/0°F	0°F/0°F
<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>		1049°F/1103°F < 2200 °F	

Upper Plenum Fluid Volume Error

An error was found in the fluid volume calculation in the upper plenum where the support column outer diameter was being used instead of the inner diameter. The correction resulted in less than 1% change in the total RCS fluid volume. The estimated PCT impact is 0°F.

References:

1. Letter L-2017-014, "10 CFR 50.46 Annual Reporting of Changes to, or Errors in Emergency Core Cooling System Models or Applications," 4/17/2017 (ML17111A867).

Table 2: Point Beach Units 1 and 2 Large Break LOCA PCT 2017 Annual Report

Evaluation Methodology:

Westinghouse, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," WCAP-16009-P-A, January 2005.

Westinghouse, "Application of Best Estimate Large Break LOCA Methodology to Westinghouse PWRs with Upper Plenum Injection," WCAP-14449-P-A Revision 1, October 1999.

Evaluation Model PCT (Unit 1/Unit 2): 1975°F/1810°F

	Net PCT Effect Unit 1/Unit 2	Absolute PCT Effect Unit 1/Unit 2
Prior 10 CFR 50.46 Changes or Error Corrections – up to Year 2016 (Reference 1)	+210°F/+248°F	210°F/340°F
10 CFR 50.46 Changes or Error Corrections – Year 2017	None	None
Sum of 10 CFR 50.46 Changes or Error Corrections	+210°F/+248°F	210°F/340°F
<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>		2185°F/2058°F < 2200 °F

References:

1. Letter L-2017-014, "10 CFR 50.46 Annual Reporting of Changes to, or Errors in Emergency Core Cooling System Models or Applications," 4/17/2017 (ML17111A867).

Table 3: Point Beach Units 1 and 2 Large Break LOCA PCT 30-Day Report

Evaluation Methodology:

Westinghouse, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)," WCAP-16009-P-A, January 2005.

Westinghouse, "Application of Best Estimate Large Break LOCA Methodology to Westinghouse PWRs with Upper Plenum Injection," WCAP-14449-P-A Revision 1, October 1999.

Evaluation Model PCT (Unit 1/Unit 2): 1975°F/1810°F

	Net PCT Effect Unit 1/Unit 2	Absolute PCT Effect Unit 1/Unit 2
Prior 10 CFR 50.46 Changes or Error Corrections – up to Year 2017 (Attachment 5, Table 2)	+210°F/+248°F	210°F/340°F
Prior 10 CFR 50.46 Changes or Error Corrections – Year 2018	None	None
New 10 CFR 50.46 Changes or Error Corrections – Year 2018		
Inconsistent application of numerical ramp applied to the entrained liquid/vapor interfacial drag coefficient	0°F/0°F	0°F/0°F
Inappropriate resetting of transverse liquid mass flow	0°F/0°F	0°F/0°F
Potential non-conservatism in the steady state fuel temperature calibration method	0°F/0°F	0°F/0°F
Sum of 10 CFR 50.46 Changes or Error Corrections	+210°F/+248°F	210°F/340°F
<i>The sum of the PCT from the most recent analysis using an acceptable evaluation model and the estimates of PCT impact for changes and errors identified since this analysis</i>	2185°F/2058°F < 2200 °F	

Point Beach Units 1 and 2 Large Break LOCA PCT 30-Day Report

Inconsistent Application of Numerical Ramp Applied to the Entrained Liquid / Vapor Interfacial Drag Coefficient

A numerical ramp which was used to account for the disappearance of the entrained liquid phase was applied to the entrained liquid / vapor interfacial drag coefficient. The numerical ramp was applied such that the interfacial drag coefficient used in the solution of the entrained liquid and vapor momentum equations was not consistent. WCOBRA/TRAC was updated to apply the numerical ramp prior to usage of the interfacial drag coefficient in the momentum equations, such that a consistent interfacial drag coefficient was used in the entrained liquid and vapor momentum equations.

The PCT impact of the error is estimated to be 0 °F.

Inappropriate Resetting of Transverse Liquid Mass Flow

In the WCOBRA/TRAC routine which evaluates the mass and energy residual error of the time step solution, the transverse liquid mass flow is reset as the liquid phase disappears. The routine is updated to remove the resetting of the transverse liquid mass flow since the routine is to only evaluate the residual error based on the time step solution values.

The PCT impact of the error is estimated to be 0 °F.

Steady-State Fuel Temperature Calibration Method

In the Automated Statistical Treatment of Uncertainty Method (ASTRUM) Best-Estimate (BE) Large-Break Loss-of-Coolant Accident (LBLOCA) Evaluation Model (EM), the steady-state fuel pellet temperature calibration method involves solving for the hot gap width (AGFACT) to calibrate the fuel temperature for each fuel rod. In some infrequent situations, small non-conservatisms can occur in the calibration process such that the resulting fuel pellet temperature will be slightly lower than intended and outside the acceptable range defined by Table 12-6 of WCAP-16009-P/NP-A.

A review of licensing basis analyses concluded that the potential non-conservatisms in the fuel pellet temperature calibration did not occur for the limiting analysis cases. Therefore, the PCT impact is 0°F.