

August 17, 2012

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

Peach Bottom Atomic Power Station, Units 2 and 3  
Renewed Facility Operating License Nos. DPR-44 and DPR-56  
NRC Docket Nos. 50-277 and 50-278

Subject: 10 CFR 50.46 Annual Report

Reference: 1) Letter from Michael D. Jesse (Exelon Generation Company, LLC)  
to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual  
Report," dated August 19, 2011

The purpose of this letter is to transmit the 10 CFR 50.46 reporting information for Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3. The previous 50.46 report for PBAPS, Units 2 and 3 (Reference 1) provided the cumulative Peak Cladding Temperature (PCT) errors for the most recent fuel designs through August 19, 2011.

Since the referenced report was issued, no vendor notifications of an Emergency Core Cooling System (ECCS) model error/change applicable to PBAPS, Units 2 and 3 have been issued. Also, no ECCS-related changes or modifications have occurred at PBAPS, Units 2 and 3 that affect the assumptions of the ECCS analyses. It should also be noted that since the last annual report (Reference 1), the GNF2 fuel design has been introduced into the PBAPS Unit 3 core. Five (5) attachments are included with this letter that provides the current 10 CFR 50.46 status for PBAPS, Units 2 and 3.

If you have any questions, please contact Tom Loomis at 610-765-5510.

Respectfully,



Michael D. Jesse  
Director - Licensing & Regulatory Affairs  
Exelon Generation Company, LLC

Attachments: 1) Peach Bottom Unit 2 | SAFER/GESTR-LOCA | GE14 Fuel  
10 CFR 50.46 Report  
2) Peach Bottom Unit 2 | SAFER/GESTR-LOCA | GNF2 Fuel  
10 CFR 50.46 Report  
3) Peach Bottom Unit 3 | SAFER/GESTR-LOCA | GE14 Fuel  
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- 4) Peach Bottom Unit 3 | SAFER/GESTR-LOCA | GNF2 Fuel  
10 CFR 50.46 Report
- 5) Assessment Notes

cc: USNRC Administrator, Region I  
R. Ennis, USNRC Senior Project Manager, PBAPS  
S. Hansell, USNRC Senior Resident Inspector, PBAPS  
R. R. Janati, Commonwealth of Pennsylvania  
S. T. Gray, State of Maryland

# **ATTACHMENT 1**

**Peach Bottom Unit 2 | SAFER/GESTR-LOCA | GE14 Fuel  
10 CFR 50.46 Report**

PLANT NAME: Peach Bottom, Unit 2 - Cycle 19

REPORT DATE: August 17, 2012

**Analysis of Record (AoR)**

Vendor: GE

ECCS Evaluation Model: SAFER/GESTR-LOCA

Evaluation Model Methodology:

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident; Volume II, SAFER/GESTR Application Methodology, Revision 1," NEDC-23785-1-PA, October 1984.

"SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-jet Pump Plants, Volume I, SAFER – Long Term Inventory Model for BWR Loss-of-Coolant Analysis," NEDC-30996P-A, October 1987.

"Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," NEDC-32950P, January 2000.

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-Of-Coolant Accident Volume III, SAFER/GESTR Application Methodology," NEDC-23785-1-PA, Rev. 1, October 1984. (Jet Pump Plant – SAFER)

Calculations:

"Peach Bottom Atomic Power Station, Units 2 and 3 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," NEDC-32163P, January 1993.

"Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, July 2000.

"Errata and Addenda Sheet for Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, October 2007.

"Peach Bottom Atomic Power Station Units 2 & 3 GNF2 ECCS-LOCA Evaluation," GEH 0000-0100-8531-R1, March 2011.

**Margin Allocation**

Fuel:	GE14
Limiting Fuel Type:	GNF2
Limiting Single Failure:	Battery Failure
Limiting Break Size/Location:	0.08 ft <sup>2</sup> Small Break in a Recirculation Discharge Pipe
Reference Peak Cladding Temperature (PCT):	1450°F

**A. Prior LOCA Model Assessments:**

30-Day 10 CFR 50.46 Report dated June 4, 2001 (See Note 1)	$\Delta PCT=55^{\circ}F$
Annual 10 CFR 50.46 Report dated December 18, 2002 (See Note 2)	$\Delta PCT=45^{\circ}F$
Annual 10 CFR 50.46 Report dated December 3, 2004 (See Note 3)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated December 1, 2005 (See Note 4)	$\Delta PCT=0^{\circ}F$
30-Day 10 CFR 50.46 Report dated August 22, 2006 (See Note 5)	$\Delta PCT=150^{\circ}F$
Annual 10 CFR 50.46 Report dated August 22, 2007 (See Note 6)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated August 22, 2008 (See Note 7)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated August 21, 2009 (See Note 8)	$\Delta PCT=15^{\circ}F$
Annual 10 CFR 50.46 Report dated August 20, 2010 (See Note 9)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated August 19, 2011 (See Note 10)	$\Delta PCT=50^{\circ}F$
<b>Net PCT</b>	<b>1765°F</b>

**B. Current LOCA Model Assessments:**

There have been no 10 CFR 50.46 notifications since last report	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma  \Delta PCT  = 0^{\circ}F$
<b>Net PCT</b>	<b>1765°F</b>

## **ATTACHMENT 2**

**Peach Bottom Unit 2 | SAFER/GESTR-LOCA | GNF2 Fuel  
10 CFR 50.46 Report**

PLANT NAME: Peach Bottom, Unit 2 - Cycle 19

REPORT DATE: August 17, 2012

**Analysis of Record (AoR)**

Vendor: GE

ECCS Evaluation Model: SAFER/GESTR-LOCA

Evaluation Model Methodology:

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident; Volume II, SAFER/GESTR Application Methodology, Revision 1," NEDC-23785-1-PA, October 1984.

"SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-jet Pump Plants, Volume I, SAFER – Long Term Inventory Model for BWR Loss-of-Coolant Analysis," NEDC-30996P-A, October 1987.

"Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," NEDC-32950P, January 2000.

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-Of-Coolant Accident Volume III, SAFER/GESTR Application Methodology," NEDC-23785-1-PA, Rev. 1, October 1984. (Jet Pump Plant – SAFER)

Calculations:

"Peach Bottom Atomic Power Station Units 2 and 3 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," NEDC-32163P, January 1993.

"Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, July 2000.

"Errata and Addenda Sheet for Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, October 2007.

"Peach Bottom Atomic Power Station Units 2 & 3 GNF2 ECCS-LOCA Evaluation," GEH 0000-0100-8531-R1, March 2011.

Fuel:	GNF2
Limiting Fuel Type:	GNF2
Limiting Single Failure:	Battery Failure
Limiting Break Size/Location:	0.06 ft <sup>2</sup> Small Break in a Recirculation Discharge Pipe
Reference Peak Cladding Temperature (PCT):	1870°F

**A. Prior LOCA Model Assessments:**

Annual 10 CFR 50.46 Report dated August 19, 2011 (See Note 10)	$\Delta PCT = 50^{\circ}F$
<b>Net PCT</b>	<b>1920°F</b>

**B. Current LOCA Model Assessments:**

There have been no 10 CFR 50.46 notifications since last report	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma  \Delta PCT  = 0^{\circ}F$
<b>Net PCT</b>	<b>1920°F</b>



## **ATTACHMENT 3**

**Peach Bottom Unit 3 | SAFER/GESTR-LOCA | GE14 Fuel  
10 CFR 50.46 Report**

PLANT NAME: Peach Bottom, Unit 3 - Cycle 19

REPORT DATE: August 17, 2012

**Analysis of Record (AoR)**

Vendor: GE

ECCS Evaluation Model: SAFER/GESTR-LOCA

Evaluation Model Methodology:

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident; Volume II, SAFER/GESTR Application Methodology, Revision 1," NEDC-23785-1-PA, October 1984.

"SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-jet Pump Plants, Volume I, SAFER – Long Term Inventory Model for BWR Loss-of-Coolant Analysis," NEDC-30996P-A, October 1987.

"Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," NEDC-32950P, January 2000.

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-Of-Coolant Accident Volume III, SAFER/GESTR Application Methodology," NEDC-23785-1-PA, Rev. 1, October 1984. (Jet Pump Plant – SAFER)

Calculations:

"Peach Bottom Atomic Power Station, Units 2 and 3 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," NEDC-32163P, January 1993.

"Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, July 2000.

"Errata and Addenda Sheet for Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, October 2007.

"Peach Bottom Atomic Power Station Units 2 & 3 GNF2 ECCS-LOCA Evaluation," GEH 0000-0100-8531-R1, March 2011.

**Margin Allocation**

Fuel:	GE14
Limiting Fuel Type:	GNF2
Limiting Single Failure:	Battery Failure
Limiting Break Size/Location:	0.08 ft <sup>2</sup> Small Break in a Recirculation Discharge Pipe
Reference Peak Cladding Temperature (PCT):	1450°F

**A. Prior LOCA Model Assessments:**

30-Day 10 CFR 50.46 Report dated June 4, 2001 (See Note 1)	$\Delta PCT=55^{\circ}F$
Annual 10 CFR 50.46 Report dated December 18, 2002 (See Note 2)	$\Delta PCT=45^{\circ}F$
Annual 10 CFR 50.46 Report dated December 3, 2004 (See Note 3)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated December 1, 2005 (See Note 4)	$\Delta PCT=0^{\circ}F$
30-Day 10 CFR 50.46 Report dated August 22, 2006 (See Note 5)	$\Delta PCT=150^{\circ}F$
Annual 10 CFR 50.46 Report dated August 22, 2007 (See Note 6)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated August 22, 2008 (See Note 7)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated August 21, 2009 (See Note 8)	$\Delta PCT=15^{\circ}F$
Annual 10 CFR 50.46 Report dated August 20, 2010 (See Note 9)	$\Delta PCT=0^{\circ}F$
Annual 10 CFR 50.46 Report dated August 19, 2011 (See Note 10)	$\Delta PCT=50^{\circ}F$
<b>Net PCT</b>	<b>1765°F</b>

**B. Current LOCA Model Assessments:**

There have been no 10 CFR 50.46 notifications since last report	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma  \Delta PCT  = 0^{\circ}F$
<b>Net PCT</b>	<b>1765°F</b>

## **ATTACHMENT 4**

**Peach Bottom Unit 3 | SAFER/GESTR-LOCA | GNF2 Fuel  
10 CFR 50.46 Report**

PLANT NAME: Peach Bottom, Unit 3 - Cycle 19

REPORT DATE: August 17, 2012

**Analysis of Record (AoR)**

Vendor: GE

ECCS Evaluation Model: SAFER/GESTR-LOCA

Evaluation Model Methodology:

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident; Volume II, SAFER/GESTR Application Methodology, Revision 1," NEDC-23785-1-PA, October 1984.

"SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-jet Pump Plants, Volume I, SAFER – Long Term Inventory Model for BWR Loss-of-Coolant Analysis," NEDC-30996P-A, October 1987.

"Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model," NEDC-32950P, January 2000.

"The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-Of-Coolant Accident Volume III, SAFER/GESTR Application Methodology," NEDC-23785-1-PA, Rev. 1, October 1984. (Jet Pump Plant – SAFER)

Calculations:

"Peach Bottom Atomic Power Station Units 2 and 3 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," NEDC-32163P, January 1993.

"Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, July 2000.

"Errata and Addenda Sheet for Peach Bottom Atomic Power Station ECCS-LOCA Evaluation for GE14," GENE-J11-03716-09-02P, October 2007.

"Peach Bottom Atomic Power Station Units 2 & 3 GNF2 ECCS-LOCA Evaluation," GEH 0000-0100-8531-R1, March 2011.

Fuel:	GNF2
Limiting Fuel Type:	GNF2
Limiting Single Failure:	Battery Failure
Limiting Break Size/Location:	0.06 ft <sup>2</sup> Small Break in a Recirculation Discharge Pipe
Reference Peak Cladding Temperature (PCT):	1870°F

**A. Prior LOCA Model Assessments:**

No Prior Assessments	$\Delta PCT = 0^{\circ}F$
<b>Net PCT</b>	<b>N/A</b>

**B. Current LOCA Model Assessments:**

Previous GNF2 Model Errors (See Note 11)	$\Delta PCT = 50^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma  \Delta PCT  = 0^{\circ}F$
<b>Net PCT</b>	<b>1920<sup>o</sup>F</b>

# **ATTACHMENT 5**

## **Assessment Notes**

1) SAFER Condensation/Pressure Rate Errors (Prior LOCA Model Assessment)

The referenced letter reported two GE LOCA errors related to a SAFER condensation error and a SAFER pressure rate error. The PCT impact for the new errors was determined to be 45°F and 10°F, respectively. These PCT errors applied to all fuel types. This letter constituted a 30-day report. The total PCT impact of these errors on GE14 fuel was determined to be 55°F.

[Reference: "Peach Bottom Atomic Power Station, Units 2 and 3 10 CFR 50.46 Reporting Requirements," June 4, 2001]

2) SAFER Core Spray Sparger Elevation/Bulk Water Level Errors (Prior LOCA Model Assessment)

The referenced letter provided the annual 50.46 report for Units 2 and 3. This letter reported GE LOCA errors related to a SAFER core spray sparger elevation error and a SAFER bulk water level error. The PCT impact for the new errors was determined to be 40°F and 5°F, respectively. These PCT errors applied to all fuel types. The total PCT impact of these errors on GE14 fuel was determined to be 45°F.

[Reference: "10 CFR 50.46 Reporting Requirements," December 18, 2002]

3) Various Errors (Prior LOCA Model Assessment)

The referenced letter provided the annual 50.46 report for Units 2 and 3. This letter reported GE LOCA errors related to a GESTR file interpolation error, a SAFER computer platform change, a WEVOL S1 volume error, a SAFER level/volume table error, a SAFER separator pressure drop error and a new heat source. The PCT impact for the new errors was determined to be 0°F for each error. The total PCT impact of these errors on GE14 fuel was determined to be 0°F.

[Reference: "10 CFR 50.46 Annual Report," December 3, 2004]

4) The referenced letter provided the annual 10 CFR 50.46 report for Peach Bottom. There were no changes to the ECCS during this period.

[Reference: "10 CFR 50.46 Annual Report," December 1, 2005]

5) Axial Power Shape Sensitivity (Prior LOCA Model Assessment)

The referenced letter provided a 30-day 50.46 report for Units 2 and 3. This letter reported a newly discovered sensitivity to the assumed axial power shape for small break LOCA cases. This sensitivity may result in higher calculated PCT values for top peaked axial power shapes. Due to this sensitivity, the calculated PCT for Peach Bottom was higher than the previously calculated value. The PCT impact was determined to be 150°F for GE14 fuel. The 0.08 ft<sup>2</sup> Small Break in a Recirculation Discharge Pipe is the Licensing Basis PCT event for Peach Bottom for GE14 fuel.

[Reference: "10 CFR 50.46 30-Day Report," August 22, 2006]



- 6) The referenced letter provided the annual 10 CFR 50.46 report for Peach Bottom. There were no changes to the ECCS during this period.

[Reference: "10 CFR 50.46 Annual Report," August 22, 2007]

- 7) The referenced letter provided the annual 10 CFR 50.46 report for Peach Bottom. There were no changes to the ECCS during this period.

[Reference: "10 CFR 50.46 Annual Report," August 22, 2008]

- 8) Steam Flow Induced Error (Prior LOCA Model Assessment)

The referenced letter provided the annual 50.46 report for Units 2 and 3. This letter reported that GE/GNF identified a Steam Flow Induced Error (SFIE, or Bernoulli Error) where water level could reach the bottom of the dryer and allow steam to bypass to the annulus. This bypass affects the L3 water level measurement, which relies on pressure taps in the annulus. Scram from the L3 level indication is conservatively modeled in the small break ECCS-LOCA analyses assuming Appendix K requirements. The DBA (large break) analyses are confirmed to be unaffected by the SFIE because the modeling relies on signals other than L3 for scram and ECCS response. The PCT impact for PBAPS GE14 fuel (small break limited) due to the SFIE was reported as 15°F.

[Reference: "10 CFR 50.46 Annual Report," August 21, 2009]

- 9) The referenced letter provided the annual 10 CFR 50.46 report for Peach Bottom. There were no changes to the ECCS during this period.

[Reference: "10 CFR 50.46 Annual Report," August 20, 2010]

- 10) Heat Deposition Database Error/Gamma Heat Deposition Error (Prior LOCA Model Assessment)

The referenced letter reported that the GNF2 fuel design had been introduced into the Peach Bottom Unit 2 core since the previous cycle. The assessment notes above are not applicable to GNF2 fuel. The referenced letter also reported that two vendor notifications of ECCS model error/changes that were applicable to Peach Bottom were issued. No ECCS-related changes or modifications had occurred at Peach Bottom that affected the assumptions of the ECCS analyses. The errors/changes are summarized below.

The first error involves the way input coefficients were used to direct the deposition of gamma radiation energy produced by the fuel. Correction of this error resulted in a PCT increase of 45°F for both the GE14 fuel and GNF2 fuel.

The second error involves the contribution of heat from gamma ray absorption by the channel. The gamma ray absorption by the channel was found to have been minimized. Correction of this error resulted in a PCT increase of 5°F for both the GE14 fuel and GNF2 fuel.

[Reference: "10 CFR 50.46 Annual Report," August 19, 2011]

11) Current LOCA Model Assessment

Since the last annual report, GNF2 fuel was introduced into the Peach Bottom Unit 3 core. The ECCS model error/changes discussed in Note 10 also apply to the GNF2 fuel in the Peach Bottom Unit 3 core resulting in a PCT increase of 50°F, identical to the GNF2 fuel in the Unit 2 core.