

RS-09-143

10 CFR 50.46

October 30, 2009

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

Clinton Power Station, Unit 1  
Facility Operating License No. NPF-62  
NRC Docket No. 50-461

**Subject:** Annual Report of Emergency Core Cooling System Evaluation Model Changes  
and Errors for Clinton Power Station

In accordance with 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," paragraph (a)(3)(ii), Exelon Generation Company, LLC (EGC) is submitting the annual report of the Emergency Core Cooling System (ECCS) Evaluation Model changes and errors for Clinton Power Station (CPS), Unit 1 . This report covers the period from November 1, 2008 through October 30, 2009.

Should you have any questions concerning this letter, please contact Mr. Mitchel A. Mathews at (630) 657-2819.

Respectfully,



Jeffrey L. Hansen  
Manager – Licensing and Regulatory Affairs

**Attachments:**

1. 10 CFR 50.46 Report
2. 10 CFR 50.46 Report Assessment Notes

PLANT NAME: Clinton Power Station, Unit 1  
ECCS EVALUATION MODEL: SAFER/GESTR - LOCA  
REPORT REVISION DATE: 10/30/09  
CURRENT OPERATING CYCLE: 12

### **ANALYSIS OF RECORD**

Evaluation Model Methodology: 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, Revision 1, General Electric Company, October 1984.

Calculation: Clinton Power Station, SAFER/GESTR-LOCA Analysis Basis Documentation, NEDC-32974P, GE Nuclear Energy, October 2000.

Fuel: GE 14

Limiting Fuel: GE 14

Limiting Single Failure: High Pressure Core Spray (HPCS) Diesel Generator

Limiting Break Size and Location: 1.0 Double Ended Guillotine of Recirculation Pump Suction Piping

**Reference Peak Cladding Temperature (PCT): 1550°F**

**MARGIN ALLOCATION**

**A. PRIOR LOCA MODEL ASSESSMENTS**

10 CFR 50.46 report dated November 13, 2000 (See Note 1)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated November 08, 2001 (See Note 2)	$\Delta PCT = 5^{\circ}F$
10 CFR 50.46 report dated November 05, 2002 (See Note 3)	$\Delta PCT = 35^{\circ}F$
10 CFR 50.46 report dated November 05, 2003 (See Note 4)	$\Delta PCT = 5^{\circ}F$
10 CFR 50.46 report dated November 05, 2004 (See Note 5)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated November 04, 2005 (See Note 6)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated November 03, 2006 (See Note 7)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 19, 2007 (See Note 8)	$\Delta PCT = 6^{\circ}F$
10 CFR 50.46 report dated November 02, 2007 (See Note 9)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated October 31, 2008 (See Note 10)	$\Delta PCT = 0^{\circ}F$
<b>Net PCT</b>	<b>1601<sup>o</sup>F</b>

**B. CURRENT LOCA MODEL ASSESSMENTS**

None (Note 11)	$\Delta PCT = 0^{\circ}F$
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>1601<sup>o</sup>F</b>

**NOTES:**

1. Prior LOCA Model Assessments

The referenced letter reported a new analysis of record for Clinton Power Station (CPS).

[Reference: Letter from M. A. Reandeau (AmerGen Energy Company) to U.S. NRC, "Report of a Change to the ECCS Evaluation Model Used for Clinton Power Station (CPS)," dated November 13, 2000.]

2. Prior LOCA Model Assessments

An inconsistent core exit steam flow was used in the pressure calculation in the SAFER code when there is a change in the two-phase level. The incorrect calculated pressure may result in premature termination of ECCS condensation and will impact the second peak clad temperature (PCT). GE evaluated the impact of this error and determined that the impact is an increase of 5°F in the PCT. This error was reported to the NRC in the referenced letter.

[Reference: Letter from K. A. Ainger (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated November 8, 2001.]

3. Prior LOCA Model Assessments

In the referenced letter to the NRC, the impact of the Low Pressure Coolant Injection (LPCI) and Low Pressure Core Spray (LPCS) minimum flow valve flow diversion was reported and was found to have a 0°F impact. Also in the referenced letter GE LOCA errors were reported all of which had a 0°F PCT increase except for a SAFER Core Spray sparger injection elevation error that resulted in a 15°F increase in the PCT. The Extended Power Uprate (EPU) has resulted in an increase of 20°F in the PCT. The EPU was implemented in Cycle 9 Reload.

[Reference: Letter from Patrick R. Simpson (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated November 5, 2002.]

#### 4. Prior LOCA Model Assessments

In the referenced letter to the NRC, the impact of an error found in the initial level/volume table for SAFER was reported. The level/volume tables were generated with incorrect initial water levels. This resulted in an incorrect volume split in the nodes above and below the water surface, and incorrect initial liquid mass. This error resulted in a 5°F increase in the PCT for all fuel types (i.e., GE 10 & GE14).

[Reference: Letter from Patrick R. Simpson (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated November 5, 2003.]

#### 5. Prior LOCA Model Assessments

In the referenced letter to the NRC, the impact of a GE postulated new heat source applicable to the LOCA event was reported. This heat source is due to recombination of hydrogen and excess oxygen drawn into the vessel from containment during core heatup. The PCT impact for all fuel types was 0°F and the effect on local oxidation was negligible.

[Reference: Letter from Patrick R. Simpson (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated November 5, 2004.]

#### 6. Prior LOCA Model Assessments

In the referenced letter to the NRC, the impact of the 24-month cycle operation was reported. The evaluation determined that the LOCA analysis of record was performed with bounding assumptions and hence is not impacted with the 24-month cycle. A 0°F PCT impact was assigned.

[Reference: Letter from Patrick R. Simpson (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated November 4, 2005.]

#### 7. Prior LOCA Model Assessments

In the referenced letter to the NRC, the impact of the top peak axial power shape on the small break LOCA was reported. The impact of the top peak axial power shape on the licensing basis PCT was 0°F for GE 14 Fuel for CPS.

[Reference: Letter from Kenneth M. Nicely (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated November 3, 2006.]

#### 8. Prior LOCA Model Assessments

In the referenced letter, the impact of the core shroud repair on the PCT was reported to the NRC. The leakage flows through the repair holes result in slightly increased time to core recovery, following core uncover. The effect has been conservatively assessed to increase the PCT for the limiting LOCA by less than 6 °F.

[Reference: Letter from Patrick R. Simpson (Exelon Generation Company) to U.S. NRC, "Updated Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated April 19, 2007.]

#### 9. Prior LOCA Model Assessments

In the referenced letter, Exelon submitted to the NRC the annual 10CFR 50.46 report for 2007. There was no LOCA model assessment for the Clinton LOCA analysis.

[Reference: Letter from Jeffrey L. Hansen (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated November 2, 2007.]

#### 10. Prior LOCA Model Assessments

In the referenced letter, Exelon submitted to the NRC the annual 10CFR 50.46 report for 2008. There was no LOCA model assessment for the Clinton LOCA analysis.

[Reference: Letter from Jeffrey L. Hansen (Exelon Generation Company) to U.S. NRC, "Annual Report of Emergency Core Cooling System Evaluation Model Changes and Errors for Clinton Power Station," dated October 31, 2008.]

#### 11. Current LOCA Model Assessments

Since the last annual report (see Note 10), no vendor notifications of Emergency Core Cooling System (ECCS) model error/changes that are applicable to Clinton have been issued. Also, no ECCS-related changes or modifications have occurred at Clinton that affect the assumptions of the ECCS analyses.