

10 CFR 50.46

April 10, 2024

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

R.E. Ginna Nuclear Power Plant  
Renewed Facility Operating License No. DPR-18  
NRC Docket No. 50-244

Subject: 2024 10 CFR 50.46 Annual Report

Reference: Letter from D. Gudger (Constellation Energy Generation, LLC) to  
U.S. Nuclear Regulatory Commission, "2023 10 CFR 50.46 Annual Report,"  
dated April 10, 2023

The purpose of this letter is to submit the 10 CFR 50.46 annual reporting information for R.E. Ginna Nuclear Power Plant. The referenced letter is the most recent annual 10 CFR 50.46 Report submitted to the U.S. Nuclear Regulatory Commission.

Two attachments are included with this letter that provide the current Ginna 10 CFR 50.46 status. Attachment 1 provides the Peak Cladding Temperature (PCT) "rack-up" sheets. Attachment 2, "Assessment Notes," contains a detailed description of each change/error reported.

There are no commitments contained in this letter. If you have any questions, please contact Ron Reynolds at (267) 533-5698.

Respectfully,



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David T. Gudger  
Senior Manager - Licensing  
Constellation Energy Generation, LLC

Attachments: 1) Peak Cladding Temperature Rack-Up Sheets for R.E. Ginna Nuclear  
Power Plant  
2) Assessment Notes

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cc: U.S. NRC Administrator, Region I  
U.S. NRC Project Manager, Ginna  
U.S. NRC Senior Resident Inspector, Ginna  
C. Swisher, Resident Inspector, Ginna  
A. L. Peterson, NYSERDA  
B. Frymire, NYSPSC  
C. Powers, NYSPSC

**ATTACHMENT 1**

**10 CFR 50.46**

**"Acceptance criteria for emergency core cooling systems  
for light-water nuclear power reactors"**

**Annual Report of the Emergency Core Cooling System  
Evaluation Model Changes and Errors**

**Assessments as of April 10, 2024**

**Peak Cladding Temperature Rack-Up Sheets for  
R.E. Ginna Nuclear Power Plant**

PLANT NAME: Ginna  
ECCS EVALUATION MODEL: Small Break Loss of Coolant Accident (SBLOCA)  
REPORT REVISION DATE: 4/10/2024  
CURRENT OPERATING CYCLE: 44

## ANALYSIS OF RECORD

Evaluation Model: NOTRUMP  
Calculation: Westinghouse CN-LIS-04-206, April 2005  
Fuel: 422 Vantage+  
Limiting Fuel Type: 422 Vantage+  
Limiting Single Failure: Diesel Generator Failure to Start  
Limiting Break Size and Location: 2-inch Equivalent High T<sub>avg</sub> Cold Leg Break  
Reference Peak Cladding Temperature (PCT) PCT = 1167.0°F

## MARGIN ALLOCATION

### A. PRIOR LOSS OF COOLANT ACCIDENT (LOCA) MODEL ASSESSMENTS

10 CFR 50.46 report dated April 30, 2007 (Note 1)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated May 4, 2008 (Note 2)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated February 10, 2009 (Note 3)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated March 26, 2010 (Note 4)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated March 4, 2011 (Note 5)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated March 27, 2012 (Note 6)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 1, 2013 (Note 8)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 9, 2014 (Note 9)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 9, 2015 (Note 10)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 7, 2016 (Note 11)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 7, 2017 (Note 12)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 6, 2018 (Note 13)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2019 (Note 14)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2020 (Note 15)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2021 (Note 16)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2022 (Note 17)	$\Delta PCT = +3^{\circ}F$
10 CFR 50.46 report dated April 10, 2023 (Note 18)	$\Delta PCT = 0^{\circ}F$
<b>NET PCT</b>	<b>PCT = 1170.0°F</b>

### B. CURRENT LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated April 10, 2024 (Note 19)	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\sum \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\sum  \Delta PCT  = 0^{\circ}F$
<b>NET PCT</b>	<b>PCT = 1170.0°F</b>

PLANT NAME: Ginna  
ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident (LBLOCA)  
REPORT REVISION DATE: 4/10/2024  
CURRENT OPERATING CYCLE: 44

## ANALYSIS OF RECORD

Evaluation Model: ASTRUM (2004)  
Calculation: Westinghouse CN-LIS-05-11, April 2005  
Fuel: 422 Vantage+  
Limiting Fuel Type: 422 Vantage+  
Limiting Single Failure: Loss of one train of ECCS flow  
Limiting Break Size and Location: Cold Leg Split Break  
Reference PCT

PCT = 1870.0°F

## MARGIN ALLOCATION

### A. PRIOR LOSS OF COOLANT ACCIDENT (LOCA) MODEL ASSESSMENTS

10 CFR 50.46 report dated April 30, 2007 (Note 1)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated May 4, 2008 (Note 2)	$\Delta PCT = +37^{\circ}F$
10 CFR 50.46 report dated February 10, 2009 (Note 3)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated March 26, 2010 (Note 4)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated March 4, 2011 (Note 5)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated March 27, 2012 (Note 6)	$\Delta PCT = 0^{\circ}F$
30-Day 10 CFR 50.46 report dated August 16, 2012 (Note 7)	$\Delta PCT = +134^{\circ}F$
10 CFR 50.46 report dated April 1, 2013 (Note 8)	$\Delta PCT = +75^{\circ}F$
10 CFR 50.46 report dated April 9, 2014 (Note 9)	$\Delta PCT = +2^{\circ}F$
10 CFR 50.46 report dated April 9, 2015 (Note 10)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 7, 2016 (Note 11)	$\Delta PCT = +1^{\circ}F$
10 CFR 50.46 report dated April 7, 2017 (Note 12)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 6, 2018 (Note 13)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2019 (Note 14)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2020 (Note 15)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2021 (Note 16)	$\Delta PCT = 0^{\circ}F$
10 CFR 50.46 report dated April 8, 2022 (Note 17)	$\Delta PCT = +5^{\circ}F$
10 CFR 50.46 report dated April 8, 2023 (Note 18)	$\Delta PCT = 0^{\circ}F$
<b>NET PCT</b>	<b>PCT = 2124.0°F</b>

### B. CURRENT LOCA MODEL ASSESSMENTS

10 CFR 50.46 report dated April 10, 2024 (Note 19)	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\sum \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\sum  \Delta PCT  = 0^{\circ}F$
<b>NET PCT</b>	<b>PCT = 2124.0°F</b>

**ATTACHMENT 2**

**10 CFR 50.46**

**"Acceptance criteria for emergency core cooling systems  
for light-water nuclear power reactors"**

**Annual Report of the Emergency Core Cooling System  
Evaluation Model Changes and Errors**

**Assessments as of April 10, 2024**

**Assessment Notes**

**R.E. Ginna Nuclear Power Plant**

1. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 30, 2007, reported new licensing basis peak cladding temperature (PCT) for small break loss of coolant accident (SBLOCA) and large break loss of coolant accident (LBLOCA) analyses to support fuel assembly transition from OFA to 422 Vantage+ and extended power uprate. The new licensing basis PCT reported for SBLOCA and LBLOCA are 1167°F and 1870°F, respectively.

2. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated May 4, 2008, reported an evaluation for LBLOCA related to HOTSPOT fuel relocation error which resulted in a 37°F PCT assessment.

3. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated February 10, 2009, reported evaluations for SBLOCA and LBLOCA model changes which resulted in 0°F PCT change.

4. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated March 26, 2010, reported evaluations for LBLOCA model changes which resulted in 0°F PCT change.

5. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated March 4, 2011, reported evaluations for SBLOCA and LBLOCA model changes which resulted in 0°F PCT change.

6. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated March 27, 2012, reported evaluations for SBLOCA and LBLOCA model changes which resulted in 0°F PCT change.

7. Prior LOCA Model Assessment

The 30-day 10 CFR 50.46 report dated August 16, 2012, reported evaluations for fuel pellet thermal conductivity degradation (TCD) and peaking factor burndown, and design input change assessments which resulted in a 134°F PCT impact for LBLOCA.

8. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 1, 2013, reported evaluations for SBLOCA model changes which resulted in 0°F PCT impact. A LBLOCA assessment for the evaluation of an elevated initial containment and accumulator temperature was submitted in a License Amendment Request for NRC review and approval. The assessment resulted in a 75°F PCT impact. This increase in temperature was approved in an NRC Safety Evaluation Report (SER) (ML14232A331) dated August 21, 2014. The SER (ML14232A331) evaluated the 10 CFR 50.46 reporting criteria explicitly.

9. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 9, 2014, reported evaluations for SBLOCA model changes which resulted in 0°F PCT impact. A LBLOCA assessment was reported related to revised heat transfer multiplier distribution which resulted in a 2°F PCT assessment.

10. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 9, 2015, reported general code maintenance for both LBLOCA and SBLOCA. An error in Decay Group Uncertainty Factors against the LBLOCA model was reported. Additionally, it reported errors in Fuel Rod Gap Conductance, Radiation Heat Transfer Model, and SBLOCA Pre-DNB Cladding Surface Heat Transfer Coefficient Calculation for the SBLOCA model. All changes resulted in 0°F PCT impact.

11. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 7, 2016, reported General Code Maintenance for the SBLOCA which led to a PCT impact of 0°F. Additionally, Ginna began inserting reconstituted fuel with 5 stainless steel filler rods starting in Cycle 39. The effects to SBLOCA are 0°F and the effects to LBLOCA are 1°F for as long as reconstituted fuel with 5 stainless steel filler rods remain in the core.

12. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 7, 2017, reported General Code Maintenance for the LBLOCA to enhance the usability of codes and to streamline future analyses which led to a PCT impact of 0°F. There were two errors assessed to the LBLOCA analysis related to the calculation of high temperature oxidation within a realistic LBLOCA calculation and to the use of the American Society of Mechanical Engineers (ASME) steam tables to calculate the steady-state upper head liquid temperature as a function of the pressure and specific enthalpy in the ASTRUM software program. Both errors each resulted in an estimated PCT impact of 0°F for 10 CFR 50.46. There were no impacts or assessments to SBLOCA.

13. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 6, 2018, reported General Code Maintenance for the SBLOCA and LBLOCA which each led to a PCT impact of 0°F. The SBLOCA also reported one error pertained to the upper plenum fluid volume calculation with an estimated PCT impact of 0°F. The LBLOCA reported three assessments with the first involving an evaluation of inconsistent application of numerical ramp applied to the entrained liquid / vapor interfacial drag coefficient, the second involving an evaluation of inappropriate resetting of transverse liquid mass flow, and the third involving an evaluation of steady-state fuel temperature calibration method. All three errors each resulted in an estimated PCT impact of 0°F for 10 CFR 50.46.

14. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 8, 2019, reported one error pertaining to fuel rod heat-up calculations for the SBLOCA which led to a PCT impact of 0°F. The LBLOCA also reported two errors, one pertaining to the CCTF model used in the WCOBRA/TRAC calculation and the second involved the modeling of vapor temperature in the



WCOBRA/TRAC codes. upper plenum fluid volume calculation with an estimated PCT impact of 0°F. Both errors each resulted in an estimated PCT impact of 0°F for 10 CFR 50.46.

15. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 8, 2020, reported one change pertaining to main steam safety valve (MSSV) setpoint pressure tolerance for the SBLOCA which led to a PCT impact of 0°F. The LBLOCA also reported three errors or changes, one pertaining to the general code maintenance, one concerning the vessel interfacial heat transfer implementation and validation basis for modeling upper plenum injection (UPI) phenomena. Each error or change resulted in an estimated PCT impact of 0°F for 10 CFR 50.46.

16. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 8, 2021, reported no error assessed to the SBLOCA analysis and two errors assessed for the LBLOCA. One error was identified in the support column metal thickness modeling. The second error was a discrepancy where unheated conductors used node sizes inconsistent with the WCOBRA/TRAC two-loop vessel model input guidelines. Both errors each resulted in an estimated LBLOCA PCT impact of 0°F for 10 CFR 50.46.

17. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 8, 2022 reported two changes and one error. General code maintenance was performed on the code that evaluates both the Small Break and Large Break LOCA analyses that resulted in a PCT impact of 0°F. An error was discovered related to the modeling of the flow area to the bottom of the barrel/baffle region for the Small Break LOCA model. This also resulted in a PCT impact of 0°F. A change was made to both the Small Break and Large Break LOCA evaluations to add an evaluation of up to 45 stainless steel filler rods to address the possibility of leaking fuel rods. The estimated effect of up to 45 reconstituted rods was evaluated as a 3°F peak cladding temperature impact on the small break LOCA NOTRUMP analysis of record and a 6°F peak cladding temperature impact on the large break LOCA ASTRUM analysis of record. The 6°F PCT increase for the large break LOCA replaces a previous evaluation of up to 5 stainless steel filler rods described in Note 11 that resulted in a 1°F LBLOCA impact.

18. Prior LOCA Model Assessment

The 10 CFR 50.46 report dated April 10, 2023 reported no error assessed to the SBLOCA analysis and one error assessed for the LBLOCA. Non-conservation of deposited energy was discovered to exist, with a very small fraction of redistributed energy not being included in the core balance rods. The energy deposited to the hot rod and hot assembly was confirmed to be conservative and correct. This item represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451. This only affects the Large Break LOCA Evaluation Model. The error was qualitatively evaluated, and the nature of the error leads to an estimated peak cladding temperature (PCT) impact of 0°F.

19. Current LOCA Model Assessment

General Code Maintenance for the LBLOCA to enhance the usability of codes and to streamline future analyses leads to an estimated peak cladding temperature (PCT) impact of 0°F.