

10 CFR 50.46

April 8, 2020

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: 2020 10 CFR 50.46 Annual Report

Reference: 1. Letter from J. Barstow (Exelon Generation Company, LLC) to
U.S. Nuclear Regulatory Commission, "2019 10 CFR 50.46 Annual
Report," dated April 8, 2019

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 610-765-5247.

Respectfully,



David T. Gudger
Senior Manager - Licensing
Exelon Generation Company, 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

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 8, 2020

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: 4/8/2020
 CURRENT OPERATING CYCLE: 41

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_{avg} 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 February 10, 2009 (Note 3)	$\Delta PCT = 0^\circ F$
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 6, 2018 (Note 13)	$\Delta PCT = 0^\circ F$
10 CFR 50.46 report dated April 8, 2019 (Note 14)	$\Delta PCT = 0^\circ F$
NET PCT	PCT =1167.0°F

B. CURRENT LOCA MODEL ASSESSMENTS

Evaluation Of An Increase To The MSSV Setpoint Pressure Tolerance (Note 15)	$\Delta PCT = 0^\circ F$
Total PCT change from current assessments	$\sum \Delta PCT = 0^\circ F$
Cumulative PCT change from current assessments	$\sum \Delta PCT = 0^\circ F$
NET PCT	PCT =1167.0°F

PLANT NAME: Ginna
 ECCS EVALUATION MODEL: Large Break Loss of Coolant Accident (LBLOCA)
 REPORT REVISION DATE: 4/8/2019
 CURRENT OPERATING CYCLE: 41

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)	Δ PCT = 0°F
10 CFR 50.46 report dated May 4, 2008 (Note 2)	Δ PCT = +37°F
10 CFR 50.46 report dated February 10, 2009 (Note 3)	Δ PCT = 0°F
10 CFR 50.46 report dated March 26, 2010 (Note 4)	Δ PCT = 0°F
10 CFR 50.46 report dated March 4, 2011 (Note 5)	Δ PCT = 0°F
10 CFR 50.46 report dated March 27, 2012 (Note 6)	Δ PCT = 0°F
10 CFR 50.46 report dated August 16, 2012 (Note 7)	Δ PCT = +134°F
10 CFR 50.46 report dated April 1, 2013 (Note 8)	Δ PCT = +75°F
10 CFR 50.46 report dated April 9, 2014 (Note 9)	Δ PCT = +2°F
10 CFR 50.46 report dated April 9, 2015 (Note 10)	Δ PCT = 0°F
10 CFR 50.46 report dated April 7, 2016 (Note 11)	Δ PCT = +1°F
10 CFR 50.46 report dated April 7, 2017 (Note 12)	Δ PCT = 0°F
10 CFR 50.46 report dated April 6, 2018 (Note 13)	Δ PCT = 0°F
10 CFR 50.46 report dated April 8, 2019 (Note 14)	Δ PCT = 0 °F
NET PCT	PCT =2119.0°F

B. CURRENT LOCA MODEL ASSESSMENTS

General Code Maintenance (Note 15)	Δ PCT = 0°F
Removal of the Vessel Interfacial Heat Transfer Limit (Note 15)	Δ PCT = 0°F
Error In UPTF Test 20 Simulations (Note 15)	Δ PCT = 0°F
Total PCT change from current assessments	$\sum \Delta$ PCT = 0°F
Cumulative PCT change from current assessments	$\sum \Delta$ PCT = 0°F
NET PCT	PCT =2119.0°F

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 8, 2020

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. Current LOCA Model Assessment

For the current LBLOCA and SBLOCA analyses, there was one error assessed to the SBLOCA analysis. The main steam safety valve (MSSV) setpoint pressure tolerance for the MSSVs with a nominal lift setpoint pressure of 1140 psig is being increased from 1% to 1.4%. The impact of this change was evaluated for the Ginna small break loss-of-coolant accident (SBLOCA) analysis. This change represents a Change in Plant Configuration or Setpoints, distinguished from an evaluation model change in Section 4 of WCAP-13451. Plant-specific evaluation was performed and determined that the 1140 psig setpoint valves only lift for a short period of time for larger, non-limiting breaks during the initial reactor coolant system (RCS) blowdown. The 2-inch break remains limiting and is not impacted because the 1140 psig setpoint valves do not lift during the transient. Therefore, this setpoint change has a negligible impact on the SBLOCA analysis results, leading to an estimated PCT impact of 0°F.

General Code Maintenance was reported for the LBLOCA analysis which had estimated PCT impact of 0°F.

The Westinghouse Code Qualification Document (CQD) Best-Estimate Large-Break LOCA (BE LBLOCA) evaluation model (EM) is documented in WCAP-12945-P-A. A limit on the vessel interfacial heat transfer was implemented into the WCOBRA/TRAC code as presented in Equation 5-12 therein. The implementation of the limit was intended to prevent any extreme conditions which are detrimental to the robustness of the numerical method. During the licensing of the method, the application of the limit was found to have a small impact on predicted results as discussed in the response to RAI1-116 of WCAP-12945-P-A. An error was found in the implementation of the vessel interfacial heat transfer limit which effectively negates the application of the limit. The error was corrected by removing the vessel interfacial heat transfer limit from the WCOBRA/TRAC code (as opposed to a direct correction of the error). Since the WCOBRA/TRAC code validation and sensitivity studies associated with the model from WCAP-12945-PA all contained the error, the removal of the limit preserves the existing validation basis and sensitivity study conclusions that were presented in the topical report. Based on the validation and RAI responses therein, it was concluded that the as-coded interfacial heat transfer models and condensation behavior was acceptable. The removal of the vessel interfacial heat transfer limit was found to have negligible impact on the WCOBRA/TRAC code validation results. The validation results in combination with pressurized water reactor large break LOCA transient calculations and engineering judgement support an estimated peak cladding temperature impact of 0°F.

The second error was discovered in the WCOBRA/TRAC model for the simulations of the Upper Plenum Test Facility (UPTF) Test 20 series, which support the validation basis for modeling upper plenum injection (UPI) phenomena. A zero-flow boundary condition was applied for a particular channel at an elevation in the reactor vessel model that is inconsistent with the intended elevation and inconsistent with the description in WCAP-14449-P-A, Revision 1. The effect of the error correction on the overall UPTF Test 20 simulation results was evaluated to have a negligible impact, such that the code validation remains valid and the estimated Peak Cladding Temperature (PCT) impact is 0°F.

Therefore, there is no PCT impact to the SBLOCA & LBLOCA analysis from the errors.