

10 CFR 50.46

NMP1L3444

January 27, 2022

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001Nine Mile Point Nuclear Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-63 and NPF-69
NRC Docket Nos. 50-220 and 50-410

Subject: 10 CFR 50.46 Annual Report

Reference: 1) Letter from D. Gudger (Exelon Generation Company, LLC) to U.S.
Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated
January 27, 2021.

The purpose of this letter is to submit the 10 CFR 50.46 annual reporting information for Nine Mile Point Nuclear Station (NMP). Since the submittal of Reference 1, vendor notifications 2021-02, 2021-04, and 2021-09 were issued against NMP Unit 1 and Notifications 2021-01 and 2021-02 were issued against NMP Unit 2. These notifications are included in this report.

Three attachments are included with this letter that provide the current NMP 10 CFR 50.46 status. Attachments 1 and 2 provide the Peak Cladding Temperature and the rack-up sheets for the NMP Unit 1 and NMP Unit 2 LOCA analyses, respectively. Attachment 3, "Assessment Notes, NMP," 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

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Attachments: 1) Peak Cladding Temperature Rack-Up Sheet for NMP Unit 1
 2) Peak Cladding Temperature Rack-Up Sheet for NMP Unit 2
 3) Assessment Notes, NMP

cc: USNRC Administrator, Region I
 USNRC Senior Project Manager, NMP
 USNRC Senior Resident Inspector, NMP
 Alyse Peterson - NYSERDA

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 January 27, 2022

Peak Cladding Temperature Rack-Up Sheet for NMP Unit 1

Nine Mile Point Nuclear Station, Unit 1

PLANT NAME: Nine Mile Point Nuclear Station, Unit 1
 ECCS EVALUATION MODEL: TRACG-LOCA
 REPORT REVISION DATE: 1/27/2022
 CURRENT OPERATING CYCLE: 25

ANALYSIS OF RECORD

1. 002N3714, Revision 0, Nine Mile Point Nuclear Station Unit 1 TRACG-LOCA Loss-of-Coolant Accident Analysis for GNF2 Fuel, March 2017

Fuel Analyzed in Calculations and in Operation: GNF2

Limiting Fuel Type: GNF2

Limiting Single Failure: 1 Diesel Generator

Limiting Break Size and Location: Recirculation Discharge 200% (7.233 ft²) split break at 100% power and flow

Reference Peak Cladding Temperature (PCT): GNF2 = 2105°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated January 27, 2017 (Note 1)	Δ PCT = N/A
10 CFR 50.46 Report dated January 26, 2018 (Note 2)	Δ PCT = -8°F
10 CFR 50.46 Report dated January 25, 2019 (Note 3)	Δ PCT = 0°F
10 CFR 50.46 Report dated January 27, 2020 (Note 4)	Δ PCT = 0°F
10 CFR 50.46 Report dated January 27, 2021 (Note 5)	Δ PCT = 0°F
NET PCT	2097°F

B. CURRENT LOCA MODEL ASSESSMENTS

Notification 2021-02 (Note 6)	$\Delta\text{PCT} = 0^\circ\text{F}$
Notification 2021-04 (Note 7)	$\Delta\text{PCT} = 0^\circ\text{F}$
Notification 2021-09 (Note 8)	$\Delta\text{PCT} = 0^\circ\text{F}$
Total PCT change from current assessments	$\Sigma\Delta\text{PCT} = 0^\circ\text{F}$
Cumulative PCT change from current assessments	$\Sigma \Delta\text{PCT} = 0^\circ\text{F}$
NET PCT	2097°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 January 27, 2022

Peak Cladding Temperature Rack-Up Sheet for NMP Unit 2

Nine Mile Point Nuclear Station, Unit 2

PLANT NAME: Nine Mile Point Nuclear Station, Unit 2
 ECCS EVALUATION MODEL: SAFER/PRIME
 REPORT REVISION DATE: 1/27/2022
 CURRENT OPERATING CYCLE: 18

ANALYSES OF RECORD

1. 002N4205-R0, "Nine Mile Point Unit 2 GNF2 ECCS-LOCA Evaluation," December 2015

Fuel Analyzed in Calculations and in Operation: GNF2

Limiting Fuel Type: GNF2

Limiting Single Failure: High Pressure Core Spray – Diesel Generator

Limiting Break Size and Location: 0.07 ft² Recirculation Suction Line Break

Reference Peak Cladding Temperature (PCT): GNF2 = 1690°F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated January 27, 2017 (Note 9)	Δ PCT = N/A
10 CFR 50.46 Report dated January 26, 2018 (Note 10)	Δ PCT = 0°F
10 CFR 50.46 Report dated January 25, 2019 (Note 11)	Δ PCT = N/A
10 CFR 50.46 Report dated January 27, 2020 (Note 12)	Δ PCT = 0°F
10 CFR 50.46 Report dated January 27, 2021 (Note 13)	Δ PCT = 0°F
NET PCT	1690°F

B. CURRENT LOCA MODEL ASSESSMENTS

Notification 2021-01 (Note 14)	$\Delta PCT = 0^{\circ}F$
Notification 2021-02 (Note 15)	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
Cumulative PCT change from current assessments	$\Sigma \Delta PCT = 0^{\circ}F$
NET PCT	1690°F

ATTACHMENT 3

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 January 27, 2022

Assessment Notes, NMP

Nine Mile Point Nuclear Station

1) Prior LOCA Assessments (Unit 1)

NMP Unit 1 replaced its existing SAFER/CORECOOL/PRIME analysis with a new TRACG-LOCA analysis [Reference 2]. The TRACG-LOCA analysis was implemented concurrent with the start of fuel Cycle 23. Because all GE11 fuel was discharged prior to Cycle 23, Cycle 23 contains a full core of GNF2 fuel, and the TRACG-LOCA analysis is applicable to GNF2 fuel only. No SAFER/CORECOOL/PRIME notifications were received between the Reference 1 10 CFR 50.46 annual report and the start of Cycle 23.

[Reference 1: Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 27, 2017]

[Reference 2: 002N3714, Revision 0, Nine Mile Point Nuclear Station Unit 1 TRACG-LOCA Loss-of-Coolant Accident Analysis for GNF2 Fuel, March 2017]

2) Prior LOCA Model Assessments (Unit 1)

Notification 2017-03 describes a counter-current flow limitation coefficient that was incorrectly applied within the bypass region. The PCT impact was estimated to be -8°F.

[Reference: Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 26, 2018]

3) Prior LOCA Model Assessments (Unit 1)

Notification 2018-01 describes that, for some uncertainties, standard deviations were used that are inconsistent with the values approved by TRACG-LOCA Licensing Topical Report. An analysis was performed using the approved standard deviations, and the results showed that the effect was not statistically significant. The PCT impact was estimated to be 0°F.

[Reference: Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 25, 2019]

4) Prior LOCA Model Assessment (Unit 1)

Notification 2019-01 describes that channel inlet subcooling was found to be incorrect in TRACG when multiple unheated nodes were modeled. Notification 2019-02 describes that the radiation heat transfer was found to be incorrect in TRACG due to a memory overwrite in the computer software. For each error, the PCT impact was estimated to be 0°F.

[Reference: Letter from D. Gudger (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 27, 2020]

5) Prior LOCA Model Assessments (Unit 1)

Notification 2020-01 identifies errors in the PRIME fuel rod code for Zircaloy irradiation growth after breakaway neutron fluence, incorrect Zircaloy thermal conductivity applied to the Zr barrier for cladding temperature drop and gap conductance during pellet-cladding gap closure. The notification shows 0°F PCT impact.

[Reference: Letter from D. Gudger (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 27, 2021]

6) Current LOCA Model Assessments (Unit 1)

Subsequent to the previous 10CFR50.46 report, Notification 2021-02 identified inconsistencies in the inner cladding surface roughness used in PRIME fuel rod code and as an input to the SAFER and TRACG calculations. The difference affects the pellet-cladding contact heat transfer and gap conductance, and the inconsistency is small. The notification shows 0°F PCT impact.

7) Current LOCA Model Assessments (Unit 1)

Subsequent to the previous 10CFR50.46 report, Notification 2021-04 identified a coding error in TRACG04P which, under certain circumstances, miscalculates the amount of non-condensable gas flowing through a side branch of a component resulting in a mass error accumulation over time in the analysis. An error impact evaluation showed negligible effect on calculated PCT. The notification shows 0°F PCT impact.

8) Current LOCA Model Assessments (Unit 1)

Subsequent to the previous 10CFR50.46 report, Notification 2021-09 was made for a recompilation of the TRACG04P code, updating it to version 4.2.76.1. Any specific changes to the code reportable under 10 CFR 50.46 have previously been reported. The notification shows 0°F PCT impact

9) Prior LOCA Model Assessments (Unit 2)

GNF2 fuel was inserted into the Unit 2 reactor core [Reference 1]. The GNF2 ECCS-LOCA analysis of record is shown as Reference 2. There are no evaluation model changes or errors reported against the GNF2 analysis since its introduction into Unit 2.

[Reference 1: Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 27, 2017]

[Reference 2: 002N4205-R0, "Nine Mile Point Unit 2 GNF2 ECCS-LOCA Evaluation," December 2015]

10) Prior LOCA Model Assessments (Unit 2)

Notification 2017-01 describes an incorrect assumption of lower tie plate leakage with an estimated PCT impact of 0 F for GNF2 fuel. Notification 2017-02 describes a change in the fuel rod upper plenum modeling with an estimated PCT impact of 0 F for GNF2 fuel.

[Reference: Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 26, 2018]

11) Prior LOCA Model Assessments (Unit 2)

Subsequent to the previous 10 CFR 50.46 report (Note 10), no notifications were received.

[Reference: Letter from J. Barstow (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 25, 2019]

12) Prior LOCA Model Assessments (Unit 2)

Notification 2019-05 describes that the driving differential pressure for forward and backward bypass leakage is limited with an upper and lower limit in SAFER, and that all the limits were implemented correctly on all nine leakage paths except for one, the lower limit for the control rod guide tube to control rod drive housing interface backward leakage path. The estimated PCT impact of 0°F for GNF2 fuel.

[Reference: Letter from D. Gudger (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 27, 2020]

13) Prior LOCA Model Assessments (Unit 2)

Notification 2020-01 identifies errors in the PRIME fuel rod code for Zircaloy irradiation growth after breakaway neutron fluence, incorrect Zircaloy thermal conductivity applied to the Zr barrier for cladding temperature drop and gap conductance during pellet-cladding gap closure. The notification shows 0 °F PCT impact.

[Reference: Letter from D. Gudger (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "10 CFR 50.46 Annual Report," dated January 27, 2021]

14) Current LOCA Model Assessments (Unit 2)

Subsequent to the previous 10CFR50.46 report, Notification 2021-01 identified an error in the value of fuel pellet to plenum spring conductance affecting the fuel rod stress and perforation model in ECCS LOCA calculations. The error only affects the temperature and plenum gas pressure calculation in the plenum region, outside of the active fuel region. The error has an insignificant effect on the rod internal pressure calculation because the heat capacity of the spring is much smaller when compared to the fuel stored energy and decay heat. The notification shows 0°F PCT impact.

15) Current LOCA Model Assessments (Unit 2)

Subsequent to the previous 10CFR50.46 report, Notification 2021-02 identified inconsistencies in the inner cladding surface roughness used in PRIME fuel rod code and as an input to the SAFER and TRACG calculations. The difference affects the pellet-cladding contact heat transfer and gap conductance, and the inconsistency is small. The notification shows 0°F PCT impact.