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10 CFR 50.46

JAFP-21-0071
July 29, 2021

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

James A. FitzPatrick Nuclear Power Plant
Renewed Facility Operating License No. DPR-59
NRC Docket No. 50-333

Subject: 10 CFR 50.46 Annual Report

The purpose of this letter is to submit the 10 CFR 50.46 reporting information for James A. FitzPatrick Nuclear Power Plant (JAF). The most recent 10 CFR 50.46 Annual Report for JAF was provided on July 28, 2020 (JAFP-20-0063).

Two attachments are included in this letter that provide the current JAF 10 CFR 50.46 status. Attachment 1, "Peak Cladding Temperature (PCT) Rack-Up Sheet", provides updated information regarding the PCT for the limiting analysis and Attachment 2, "Assessment Notes", contains a detailed description of each change or error reported.

No new regulatory commitments are established in this submittal.

If additional information is needed, please contact Christian Williams at (610) 765-5729.

Respectfully,

David T. Gudger

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

Attachments:
1) Peak Cladding Temperature Rack-Up Sheet
2) Assessment Notes

cc: USNRC Administrator, Region I
USNRC Project Manager, JAF
USNRC Senior Resident Inspector, JAF
A. L. Peterson, NYSERDA

ATTACHMENT 1

Annual Report of the Emergency Core Cooling System
Evaluation Model Changes and Errors
Assessments as of July 29, 2021
Peak Cladding Temperature Rack-Up Sheet for JAF

PLANT NAME: James A. FitzPatrick
ECCS EVALUATION MODEL: SAFER/GESTR-LOCA supplemented with PRIME
REPORT REVISION DATE: 07/29/2021
CURRENT OPERATING CYCLE: 25

ANALYSIS OF RECORD CALCULATIONS

1. 0000-0076-4111-R0 Rev 0, James A. Fitzpatrick Nuclear Power Plant GNF2 ECCS-LOCA Evaluation, August 2008 (JAF-RPT-08-00014 Rev 0)

Fuels Analyzed in Calculations and in Operation: GNF2
Limiting Fuel Type: GNF2
Limiting Single Failure: Battery Failure
Limiting Break Size and Location: Double-Ended Guillotine in a Recirculation Suction Pipe
Reference Peak Cladding Temperature (PCT): GNF2 = 1800 °F

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

10 CFR 50.46 Report dated December 22, 2008 (Note 1)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated July 31, 2009 (Note 2)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated July 31, 2010 (Note 3)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated August 1, 2011 (Note 4)	GNF2:	ΔPCT = 50
10 CFR 50.46 Report dated August 1, 2012 (Note 5)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated August 1, 2013 (Note 6)	GNF2:	ΔPCT = 40
10 CFR 50.46 Report dated August 1, 2014 (Note 7)	GNF2:	ΔPCT = 35
10 CFR 50.46 Report dated August 3, 2015 (Note 8)	GNF2:	ΔPCT = -25
10 CFR 50.46 Report dated August 1, 2016 (Note 9)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated August 1, 2017 (Note 10)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated August 1, 2018 (Note 11)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated August 1, 2019 (Note 12)	GNF2:	ΔPCT = 0
10 CFR 50.46 Report dated July 28, 2020 (Note 13)	GNF2:	ΔPCT = 0
NET PCT	**GNF2:**	**1900 °F**

B. CURRENT LOCA MODEL ASSESSMENTS

Notification 2021-01 (Note 14)	GNF2: $\Delta PCT = 0$
Notification 2021-02 (Note 14)	GNF2: $\Delta PCT = 0$
Total PCT change from current assessments	GNF2: $\sum \Delta PCT = 0$
Cumulative PCT change from current assessments	GNF2: $\sum \lvert \Delta PCT \rvert = 0$
NET PCT	**GNF2: 1900 °F**

ATTACHMENT 2

Annual Report of the Emergency Core Cooling System
Evaluation Model Changes and Errors
Assessments as of July 29, 2021
Assessment Notes for JAF

1) Prior LOCA Model Assessment

GNF2 fuel was first installed during Refueling Outage 18, October 2008.

No changes or errors were reported against GNF2 during this reporting period.

[Reference: Letter from E. Dorman (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-08-0133, "10 CFR 50.46 Annual Report – Errors in Emergency Core Cooling System (ECCS) Evaluation Models," dated December 22, 2008.]

2) Prior LOCA Model Assessment

No changes or errors were reported against GNF2 during this reporting period.

[Reference: Letter from J. Pechacek (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-09-0091, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System (ECCS) Evaluation Models," dated July 31, 2009.]

3) Prior LOCA Model Assessment

No changes or errors were reported against GNF2 during this reporting period.

[Reference: Letter from J. Pechacek (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-10-0084, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System (ECCS) Evaluation Models," dated July 31, 2010.]

4) Prior LOCA Model Assessment

Two errors were reported against GNF2 fuel during this reporting period.

Error 2011-02 described the database error for heat deposition on peak cladding temperature (PCT) for 10x10 fuel bundles. The error was estimated to increase the GNF2 PCT by +45 ºF.

Error 2011-03 described the updated formulation for gamma heat deposition to the channel wall for 10x10 fuel bundles. The error was estimated to increase the GNF2 PCT by +5 ºF.

[Reference: Letter from Eugene W. Dorman (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-11-0097, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System (ECCS) Evaluation Models," dated August 1, 2011.]

5) Prior LOCA Model Assessment

No changes or errors were reported against GNF2 during this reporting period.

[Reference: Letter from Jorge O'Farrill (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-12-0089, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System Evaluation Models," dated August 1, 2012.]

6) Prior LOCA Model Assessment

One change was reported against GNF2 during this reporting period.

Change 2012-01 described the impact from PRIME implementation to compute fuel properties. The error was estimated to increase the GNF2 PCT by +40 ºF.

[Reference: Letter from Chris M. Adner (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-13-0096, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System Evaluation Models," dated August 1, 2013.]

7) Prior LOCA Model Assessment

Four changes and errors were reported against GNF2 fuel during this reporting period.

Change 2014-01 described code maintenance changes. These changes were estimated to have no impact upon the GNF2 PCT.

Error 2014-02 described a mass non-conservatism. The error was estimated to increase the GNF2 PCT by +10 ºF.

Error 2014-03 described an error in the minimum core differential pressure model. The error was estimated to increase the GNF2 PCT by +20 ºF.

Error 2014-04 Rev 0 described an error in the bundle / lower plenum counter-current flow-limited head model. The error was estimated to increase the GNF2 PCT by +5 ºF.

[Reference: Letter from Chris M. Adner (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-14-0094, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System Evaluation Models," dated August 1, 2014.]

8) Prior LOCA Model Assessment

One error was reported against GNF2 fuel during this reporting period.

Error 2014-04 Rev 1 was issued as a revision to error notification 2014-04 Rev 0 (Note 7). The revision identified a change to the hot bundle pressure head used as input to the counter-current flow-limited head model that resulted in a benefit (PCT reduction). With this revised notice, the prior PCT change of +5 ºF was replaced by a PCT change of -20 ºF. Consequently, the error was estimated to have a net change upon GNF2 PCT of -25 ºF.

[Reference: Letter from Chris M. Adner (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-15-0092, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System Evaluation Models," dated August 3, 2015.]

9) Prior LOCA Model Assessment

No changes or errors were reported against GNF2 during this reporting period.

[Reference: Letter from William C. Drews (Entergy Nuclear Operations) to the U.S. Nuclear Regulatory Commission, JAFP-16-0121, "10 CFR 50.46 Annual Report – Changes and Errors in Emergency Core Cooling System Evaluation Models," dated August 1, 2016.]

10) Prior LOCA Model Assessment

One error was reported against GNF2 during this reporting period.

Error 2017-01 identifies that the GNF2 leakage paths between the bundle and the bypass (lower tie plate flow hole and channel to lower tie plate interface) were incorrectly modeled. The error was estimated to have no impact upon the GNF2 PCT.

[Reference: Letter from James Barstow (Exelon Generation) to the U.S. Nuclear Regulatory Commission, JAFP-17-0076, "10 CFR 50.46 Annual Report," dated August 1, 2017.]

11) Prior LOCA Model Assessment

One error was reported against GNF2 during this reporting period.

Change 2017-02 describes a change in the GNF2 upper plenum model. The generic upper plenum model was changed to more explicitly model the GNF2 fuel design. The change was estimated to have no impact upon the GNF2 PCT.

[Reference: Letter from James Barstow (Exelon Generation) to the U.S. Nuclear Regulatory Commission, JAFP-18-0069, "10 CFR 50.46 Annual Report," dated August 1, 2018.]

12) Prior LOCA Model Assessment

No changes or errors were reported against GNF2 during this reporting period.

[Reference: Letter from James Barstow (Exelon Generation) to the U.S. Nuclear Regulatory Commission, JAFP-19-0072, "10 CFR 50.46 Annual Report," dated August 1, 2019.]

13) Prior LOCA Model Assessment

Notification 2019-05 identifies that the upper and lower limits for the SAFER code forward and backward bypass leakage were coded incorrectly for the control rod guide tube to control rod drive housing interface backward leakage path. The error was estimated to have zero degree upon the GNF2 PCT.

Notification 2020-01 identifies that the PRIME code contained errors in irradiation growth after a breakaway neutron fluence, thermal conductivity applied to the zirconium barrier for cladding temperature drop, and gap conductance during pellet-cladding gap closure. The errors were estimated to have zero degree impact upon the GNF2 PCT.

[Reference: Letter from David T. Gudger (Exelon Generation) to the U.S. Nuclear Regulatory Commission, JAFP-20-0063, "10 CFR 50.46 Annual Report," dated July 28, 2020.]

14) Current LOCA Model Assessment

Notification 2021-01 identifies an error in the fuel rod stress and perforation model due to an incorrect value used for the fuel pellet to plenum spring conductance input. The error was a result of an incorrect conversion from SI units in preparing the input for SAFER analyses. The error was estimated to have a zero degree impact upon the GNF2 PCT.

Notification 2021-02 identifies an error in the inner cladding surface roughness value in the gap conductance model. An inconsistency was identified between the roughness value used in the fuel performance model PRIME and the input to the SAFER and TRACG calculations. The error was estimated to have a zero degree impact upon the GNF2 PCT.