



LR-N21-0071
30 September 2021

10 CFR 50.46

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

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
Docket No. 50-354

Subject: 2021 Annual 10 CFR 50.46 Report

Pursuant to the requirements of 10 CFR 50.46, PSEG Nuclear LLC (PSEG) hereby reports changes in the application of the Emergency Core Cooling System (ECCS) evaluation models for the Hope Creek Generating Station. In accordance with 10 CFR 50.46(a)(3)(ii), licensees are required to report, at least annually, each change to or error discovered in evaluation models used for calculating ECCS performance and the estimated effect on the limiting ECCS analysis. This letter and its attachments satisfy the annual reporting requirement.

For the current operating cycle, the Hope Creek core consists only of GNF2 fuel assemblies in the Cycle 24 core and is the first cycle without any GE14 fuel assemblies.

There are no regulatory commitments in this correspondence.

If you have any questions regarding this submittal, please contact Frank Safin at (856) 339-1937.

Sincerely,

A handwritten signature in black ink, appearing to read "S. Poorman", written over a horizontal line.

Steven R. Poorman
Plant Manager, Hope Creek Generating Station

Attachment 1: Hope Creek Generating Station 10 CFR 50.46 Report - Peak Cladding
Temperature Rack-up Sheet

Attachment 2: Hope Creek Generating Station 10 CFR 50.46 Report - Assessment Notes

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cc: Regional Administrator - USNRC Region I
 USNRC Project Manager - Hope Creek
 USNRC Senior Resident Inspector - Hope Creek (X24)
 NJ Bureau of Nuclear Engineering
 Corporate Commitment Coordinator (N21)

Attachment 1

Hope Creek Generating Station 10 CFR 50.46 Report
Peak Cladding Temperature Rack-up Sheet
(2 pages)

Attachment 1

Hope Creek Generating Station 10 CFR 50.46 Report Peak Cladding Temperature Rack-up Sheet Page 1 of 2

PLANT NAME: Hope Creek Generating Station
ECCS EVALUATION MODEL: SAFER/GESTR-PRIME
REPORT REVISION DATE: 9/15/2021
CURRENT OPERATING CYCLE: 24

ANALYSIS OF RECORD

Evaluation Model: 1. The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology, NEDE-23785-1-PA, General Electric Company, Revision 1, October 1984.

2. Licensing Topical Report, The PRIME Model for Analysis of Fuel Rod Thermal-Mechanical Performance, Part 1 – Technical Bases, NEDC-33256P-A, Revision 1, Part 2 – Qualification, NEDC-33257P-A, Revision 1, and Part 3 – Application Methodology, NEDC-33258P-A, Revision 1, September 2010. (See Assessment Note 1)

Calculations: Hope Creek Generating Station GNF2 ECCS-LOCA Evaluation, 002N5176-R0, Revision 0, August 2016.

Fuel: GNF2

Limiting Fuel Type – Licensing Basis PCT: GNF2

Limiting Single Failure: Battery

Limiting Break Size and Location: Double-Ended Guillotine in a Recirculation Suction Pipe

Fuel Type:	GNF2
Reference PCT	1610 °F

Attachment 1

Hope Creek Generating Station 10 CFR 50.46 Report Peak Cladding Temperature Rack-up Sheet Page 2 of 2

MARGIN ALLOCATION

A. PRIOR LOCA MODEL ASSESSMENTS

	GNF2
2017-01: GNF2 Lower Tie Plate Leakage (see Assessment Note 2)	$\Delta PCT = -20^{\circ}\text{F}$
2017-02: Fuel Rod Plenum Temperature Update (see Assessment Note 2)	$\Delta PCT = 0^{\circ}\text{F}$
004N1122-R0: Summary of GEH AOO Transient and LOCA Analyses with Respect to ASD Modification in HCGS (see Assessment Note 2)	$\Delta PCT = 20^{\circ}\text{F}$
2019-05: SAFER Lower Limit on Differential Pressure for Bypass Leakage (see Assessment Note 2)	$\Delta PCT = 0^{\circ}\text{F}$
2020-01: PRIME Coding Errors for Zircaloy Irradiation Growth and Zr Barrier Thermal Conductivity as input to ECCS LOCA Analyses (see Assessment Note 2)	$\Delta PCT = 0^{\circ}\text{F}$
Net PCT	1610 °F

B. CURRENT LOCA MODEL ASSESSMENTS

	GNF2
2021-01: Error in Fuel Pellet to Plenum Spring Conductance (see Assessment Note 3)	$\Delta PCT = 0^{\circ}\text{F}$
2021-02: Discrepancy in Inner Cladding Surface Roughness (see Assessment Note 4)	$\Delta PCT = 0^{\circ}\text{F}$
Total PCT change from current assessments	$\sum \Delta PCT = 0^{\circ}\text{F}$
Cumulative PCT change for current assessments	$\sum \Delta PCT = 0^{\circ}\text{F}$
Net PCT	1610 °F

Attachment 2

Hope Creek Generating Station 10 CFR 50.46 Report
Assessment Notes
(1 page)

Attachment 2

Hope Creek Generating Station 10 CFR 50.46 Report Assessment Notes Page 1 of 1

1. Evaluation Model

The GESTR fuel rod thermal mechanical models described in Evaluation Model Reference 1 were replaced by the PRIME fuel rod thermal mechanical models described in Evaluation Model Reference 2.

2. Prior LOCA Model Assessments

Letter LR-N16-0234 reported the implementation of GNF2 and associated evaluation. All prior LOCA model assessments were incorporated, as applicable, in the licensing basis GNF2 evaluation.

Letter LR-N17-0141 reported the impact of Evaluation Model changes or errors associated with the modeling of GNF2 lower tie plate leakage and use of modern fuel rod design input for fuel rod plenum modeling.

Letter LR-N18-0099 reported the impact of the replacement of the recirculation system motor-generator sets with adjustable speed drives (ASD).

Letter LR-N20-0063 reported the impact of errors associated with the differential pressure lower limit for bypass leakage, Zircaloy irradiation growth, thermal conductivity of the Zr barrier, and gap conductance during pellet-cladding gap closure.

3. Current LOCA Model Assessments – 2021-01: Error in Fuel Pellet to Plenum Spring Conductance

GE Hitachi (GEH) Notification Letter 2021-01 reported an error in the fuel pellet to plenum spring conductance value applied to the temperature and gas pressure calculations for the plenum region of the rods. The effect of the error on Hope Creek Generating Station's licensing basis PCT value is 0 degrees F. The resulting PCT value therefore remains within compliance of the 50.46(b)(1) criterion that peak cladding temperature shall not exceed 2200 degrees F.

4. Current LOCA Model Assessments – 2021-02: Discrepancy in Inner Cladding Surface Roughness

GE Hitachi (GEH) Notification Letter 2021-02 reported an inconsistency in the inner cladding surface roughness used by the PRIME and SAFER models. The effect of the error on Hope Creek Generating Station's licensing basis PCT value is 0 degrees F. The resulting PCT value therefore remains within compliance of the 50.46(b)(1) criterion that peak cladding temperature shall not exceed 2200 degrees F.