



10 CFR 50.46

LR-N17-0141

SEP 27 2017

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

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

Subject: 2017 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 of GE14 fuel assemblies and GNF2 fuel assemblies (there are 212 GNF2 assemblies in the Cycle 21 core; the remainder are GE14).

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 "Ed Casulli", with a stylized flourish above it. Below the signature, the name "Edward T. Casulli" is printed in a small, sans-serif font.

Edward T Casulli
Plant Manager - Hope Creek

ttm

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: Mr. Daniel H. Dorman, Regional Administrator - USNRC Region I
Ms. Carleen Parker, USNRC Project Manager - Hope Creek
Mr. Justin Hawkins, USNRC Senior Resident Inspector - Hope Creek (X24)
Mr. Patrick Mulligan, Manager IV, NJ Bureau of Nuclear Engineering
Mr. Thomas MacEwen, Hope Creek Commitment Coordinator (H02)
Mr. Lee Marabella, Corporate Commitment Coordinator (N21)

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-LOCA (GE14)
 SAFER/GESTR-PRIME (GNF2)
 REPORT REVISION DATE: 9/12/2017
 CURRENT OPERATING CYCLE: 21

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-33257P-A, Revision 1, September 2010. (See Assessment Note 1)
- Calculations:
1. GE14: "SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis for Hope Creek Generating Station at Power Uprate," NEDC-33172P, GE Energy, Nuclear, March 2005.
 2. GNF2: Hope Creek Generating Station GNF2 ECCS-LOCA Evaluation, 002N5176-R0, Revision 0, August 2016.

Fuel: GE14 and 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:	GE14	GNF2
Reference PCT	1380 °F	1610 °F

Attachment 1

**Hope Creek Generating Station 10 CFR 50.46 Report
Peak Cladding Temperature Rack-up Sheet**

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MARGIN ALLOCATION**A. PRIOR LOCA MODEL ASSESSMENTS**

	GE14	GNF2
2006-01 Impact of Top Peaked Power Shape on Small Break LOCA Analysis (see Assessment Note 2)	$\Delta PCT = 0^{\circ}F$	NA
2011-02: Impact of database error for heat deposition on the Peak Cladding Temperature (PCT) for 10 x 10 fuel bundles (see Assessment Note 2)	$\Delta PCT = 45^{\circ}F$	NA
2011-03: Impact of updated formulation for gamma heat deposition to channel wall for 9 x 9 and 10 x 10 fuel bundles (see Assessment Note 2)	$\Delta PCT = 5^{\circ}F$	NA
2012-01: PRIME Fuel Properties Implementation for Fuel Rod T/M Performance, replacing GESTR Fuel Properties (see Assessment Note 2)	$\Delta PCT = 45^{\circ}F$	NA
2014-01: SAFER04A E4-Maintenance Update Changes. (see Assessment Note 2)	$\Delta PCT = 0^{\circ}F$	NA
2014-02: SAFER04A E4-Mass Non-Conservatism. (see Assessment Note 2)	$\Delta PCT = 10^{\circ}F$	NA
2014-03: SAFER04A E4-Minimum Core DP Model. (see Assessment Note 2)	$\Delta PCT = 20^{\circ}F$	NA
2014-04: SAFER04A E4-Bundle/Lower Plenum CCFL Head. (see Assessment Note 2)	$\Delta PCT = -20^{\circ}F$	NA
Net PCT	1485 °F	1610 °F

B. CURRENT LOCA MODEL ASSESSMENTS

	GE14	GNF2
2017-01: GNF2 Lower Tie Plate Leakage (see Assessment Note 3)	NA	$\Delta PCT = -20^{\circ}F$
2017-02: Fuel Rod Plenum Temperature Update (see Assessment Note 4)	$\Delta PCT = 0^{\circ}F$	$\Delta PCT = 0^{\circ}F$
Total PCT change from current assessments	$\sum \Delta PCT = 0^{\circ}F$	$\sum \Delta PCT = -20^{\circ}F$
Cumulative PCT change for current assessments	$\sum \Delta PCT = 0^{\circ}F$	$\sum \Delta PCT = 20^{\circ}F$
Net PCT	1485 °F	1590 °F

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

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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

Letters, LR-N08-0221 and LR-N11-0275, reported the impact of the top peaked axial power shape on the small break LOCA for GE14 fuel for Hope Creek.

Letter LR-N11-0275 reported the impact of the database error for heat deposition on the Peak Cladding Temperature (PCT) for 10 x 10 fuel bundles and the impact of updated formulation for gamma heat deposition to channel wall for 9 x 9 and 10 x 10 fuel bundles as applicable to Hope Creek GE14 fuel.

Letter LR-N13-0210 reported the impact of PRIME Fuel Properties Implementation for Fuel Rod T/M Performance, replacing GESTR Fuel Properties.

Letter LR-N14-0211 reported the impact of Evaluation Model changes or errors associated with SAFER04A E4-Maintenance Update Changes, E4-Mass Non-Conservatism, E4-Minimum Core DP Model, and E4-Bundle/Lower Plenum CCFL Head.

All prior LOCA model assessments were incorporated, as applicable, in the licensing basis GNF2 evaluation.

3. Current LOCA Model Assessments – 2017-01: GNF2 Lower Tie Plate Leakage

GE Hitachi (GEH) Notification Letter 2017-01 reported an error in the modeling of the GNF2 fuel type evaluated by GEH LOCA analysis computer codes. The GNF2 fuel type's connection between the lower tie plate and channel uses a thicker lower end channel and does not use the finger springs used by other fuel types. The GNF2 lower tie plates also have a different flow hole diameter. These changes were not incorporated into the updated input to GEH's computer codes for GNF2 implementation, causing modeled backflow leakage at the bottom of the bundle to go unchanged. The effect of the error on Hope Creek Generating Station's GNF2 licensing basis PCT is a decrease of 20 degrees F. The resulting PCT is in compliance with the 50.46(b)(1) criterion that peak cladding temperature shall not exceed 2200 degrees F.

GNF2 model input error does not impact GE14 evaluation.

4. Current LOCA Model Assessments – 2017-02: Fuel Rod Plenum Temperature Update

GE Hitachi (GEH) Notification Letter 2017-02 reported a change to the fuel rod plenum temperature modeling input to GEH ECCS-LOCA evaluation models. Fuel rod plenum modeling used a single generic fuel rod design input. GEH has decided to update the fuel rod design inputs to reflect modern fuel rod designs, including the removal of the getter for hydrogen absorption. The effect of the change on Hope Creek Generating Station's licensing basis PCT values for both fuel types is 0 degrees F. Both resulting PCT values therefore remain within compliance with the 50.46(b)(1) criterion that peak cladding temperature shall not exceed 2200 degrees F.