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PSEG
*Nuclear LLC*

10 CFR 50.46

LR-N19-0093

**SEP 2 5 2019**

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: 2019 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 412 GNF2 fuel assemblies and 352 GE14 fuel assemblies) in the Cycle 22 core.

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,

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

**Attachment 1**

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



| | |
|---|---|
| PLANT NAME: | Hope Creek Generating Station |
| ECCS EVALUATION MODEL: | SAFER/GESTR-LOCA (GE14)<br>SAFER/GESTR-PRIME (GNF2) |
| REPORT REVISION DATE: | 9/20/2019 |
| CURRENT OPERATING CYCLE: | 22 |

**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**



## 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) | ΔPCT = 0°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) | ΔPCT = 45°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) | ΔPCT = 5°F | NA |
| 2012-01: PRIME Fuel Properties Implementation for Fuel Rod T/M Performance, replacing GESTR Fuel Properties (see Assessment Note 2) | ΔPCT = 45°F | NA |
| 2014-01: SAFER04A E4-Maintenance Update Changes. (see Assessment Note 2) | ΔPCT = 0°F | NA |
| 2014-02: SAFER04A E4–Mass Non-Conservatism. (see Assessment Note 2) | ΔPCT = 10°F | NA |
| 2014-03: SAFER04A E4-Minimum Core DP Model. (see Assessment Note 2) | ΔPCT = 20°F | NA |
| 2014-04: SAFER04A E4-Bundle/Lower Plenum CCFL Head. (see Assessment Note 2) | ΔPCT = -20°F | NA |
| 2017-01: GNF2 Lower Tie Plate Leakage (see Assessment Note 2) | NA | ΔPCT = -20°F |
| 2017-02: Fuel Rod Plenum Temperature Update (see Assessment Note 2) | ΔPCT = 0°F | ΔPCT = 0°F |
| 004N1122-R0: Summary of GEH AOO Transient and LOCA Analyses with Respect to ASD Modification in HCGS (see Assessment Note 2) | ΔPCT = 20°F | ΔPCT = 20°F |
| Net PCT | **1505 °F** | **1610 °F** |

## B. CURRENT LOCA MODEL ASSESSMENTS

| | GE14 | GNF2 |
|---|---|---|
| None (see Assessment Note 3) | | |
| Total PCT change from current assessments | $\sum \Delta PCT = 0°F$ | $\sum \Delta PCT = 0°F$ |
| Cumulative PCT change for current assessments | $\sum \lvert \Delta PCT \rvert = 0°F$ | $\sum \lvert \Delta PCT \rvert = 0°F$ |
| Net PCT | **1505 °F** | **1610 °F** |

**Attachment 2**

**Hope Creek Generating Station 10 CFR 50.46 Report**
**Assessment Notes**



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.

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).

3. Current LOCA Model Assessments

No new assessments since last 10 CFR 50.46 Report transmitted in LR-N18-0099. Therefore, the GE14 and GNF2 fuel types remain in compliance with the 50.46(b)(1) criterion that peak cladding temperature shall not exceed 2200 degrees F.