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Dominion®

May 8, 2014

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

Serial No. 14-178
NL&OS/MAE R0
Docket No. 50-336
License No. DPR-65

**DOMINION NUCLEAR CONNECTICUT, INC.**
**MILLSTONE POWER STATION UNIT 2**
**30-DAY REPORT OF EMERGENCY CORE COOLING SYSTEM (ECCS) MODEL CHANGES PURSUANT TO THE REQUIREMENTS OF 10 CFR 50.46**

In accordance with 10 CFR 50.46(a)(3)(ii), Dominion Nuclear Connecticut, Inc., (DNC) hereby submits information regarding cumulative errors in AREVA's Small Break Loss of Coolant Accident (SBLOCA) Emergency Core Cooling System (ECCS) Evaluation Model for Millstone Power Station Unit 2 (MPS2) on Peak Clad Temperature (PCT). The sum of the absolute magnitudes of PCT changes since the last 30-day report is 80°F, which is greater than the 50°F limit for reporting as defined in 10 CFR 50.46(a)(3)(i).

Attachment 1 provides a report describing the changes associated with the AREVA SBLOCA ECCS Evaluation Model for MPS2 since the last 30-day report. Information regarding the effect of the PCT changes to the reported SBLOCA rack-up is provided for MPS2 in Attachment 2. The licensing basis PCT is 1881°F for MPS2.

10 CFR 50.46(a)(3)(ii) requires the licensee to provide a report within 30 days, which includes a proposed schedule for providing a reanalysis or taking other action as may be needed to show compliance with 10 CFR 50.46. DNC has reviewed the information provided by AREVA and determined that the adjusted SBLOCA PCT values and the manner in which they were derived continue to conform to the requirements of 10 CFR 50.46. As such, DNC considers the scheduler requirements of 10 CFR 50.46(a)(3)(ii) to be satisfied with the submission of this notification. DNC routinely tracks adjustments to the SBLOCA calculated PCT values to ensure that reasonable margins to the acceptance value set by 10 CFR 50.46 are maintained.

In a letter dated November 1, 2012 (SN 12-578), DNC provided a schedule for reanalysis of the SBLOCA event. Specifically, within one year of NRC approval of Supplement 1 of AREVA topical report EMF-2328, Revision 0, DNC plans to submit a reanalysis of the SBLOCA event using the evaluation model described in that topical report. With a new licensing basis PCT of 1881°F for MPS2, DNC concludes that the SBLOCA reanalysis schedule is not adversely affected by the PCT assessment provided herein.

A002
NRR

This information satisfies the 30-day reporting requirements of 10 CFR 50.46(a)(3)(ii). If you have any further questions regarding this submittal, please contact Mr. William Bartron at (860) 444-4301.

Sincerely,

Mark D. Sartain
Vice President – Nuclear Engineering

Commitments made in this letter: None

Attachments:

1. Report of Changes in AREVA Small Break LOCA ECCS Evaluation Model – Millstone Power Station Unit 2.
2. 30 Day Reporting of 10 CFR 50.46 Margin Utilization – Millstone Power Station Unit 2.

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# ATTACHMENT 1

## REPORT OF CHANGES IN
## AREVA SMALL BREAK LOCA ECCS EVALUATION MODEL

**MILLSTONE POWER STATION UNIT 2**
**DOMINION NUCLEAR CONNECTICUT, INC.**

# Report of Changes in AREVA SBLOCA ECCS Evaluation Model Millstone Power Station Unit 2

## Identification of ECCS Evaluation Model Change

The small break loss of coolant accident (SBLOCA) analyses for Millstone Power Station Unit 2 (MPS2) were performed using the AREVA S-RELAP5 computer code. Since the submittal of the last 30-day 10 CFR 50.46 report, AREVA has informed MPS2 of one error impacting the SBLOCA peak clad temperature (PCT). The code error impact and the results of an assessment to determine the impact on PCT are provided below.

Change: S-RELAP5 Vapor Absorptivity Correlation (+80°F)

AREVA CR 2012-8371 was written to evaluate observed differences between SRELAP-5 BWR LOCA results and data from the Thermal Hydraulic Test Facility (THTF).

Upon review, it was determined that the correlation for vapor absorptivity used in S-RELAP5 was being applied outside its intended range of applicability in that no limit on the pressure was applied in the code.

The vapor absorptivity correlation applied to the S-RELAP5 based methodologies is provided in the S-RELAP5 Models and Correlation Code Manual, Reference 1. The equation used for the absorption coefficient of vapor contains the term of the pressure which needs to be truncated in order to obtain the correct emissivity values for an optically thick steam. The applicability of the pressure limit is described in literature by S.S. Penner (Reference 2). No lower pressure limit on the vapor absorptivity correlation is required as the correlation is developed for optically thin gases, which already applies at low pressures.

Results show that limiting the vapor absorptivity correlation to within its intended pressure range allows S-RELAP5 to predict the wall temperatures for THTF within the uncertainty bands or above the uncertainty bands (conservative).

To assess the impact on the current analysis of record (AOR) for SBLOCA, a developmental version of S-RELAP5 was prepared which included the pressure limit for the calculation of the vapor absorptivity. The PCT increase was determined by comparing the AOR after correcting the previously reported errors with the new PCT results obtained with the developmental version of S-RELAP5. The limiting case and multiple break sizes around the limiting case were rerun with the developmental code version of S-RELAP5. The estimated impact of this change on the Millstone Unit 2 SBLOCA analysis calculated peak cladding temperature is +80°F, leading to a new calculated PCT of 1881°F.

## Conclusion

Dominion has performed an evaluation of PCT for comparison to 10 CFR 50.46 requirements. The analysis of record PCT for MPS2 is 1941°F. Considering the current PCT changes, as well as previously reported changes and errors, the licensing basis SBLOCA PCT is 1881°F for MPS2. The SBLOCA results have sufficient margin to the 2200°F limit specified in 10 CFR 50.46(b)(1). The current PCT assessment of 80°F is greater than the 50°F limit for reporting as defined in 10 CFR 50.46(a)(3)(i); hence, the change is significant and submittal of this 30-day report to the NRC is required.

## References

1. AREVA Document EMF-2100(P), Rev.16, "S-RELAP5 Models and Correlation Code Manual."

2. S. S. Penner, "Quantitative Molecular Spectroscopy and Gas Emissivities," Addison Wesley Publishing Company, Inc.

# ATTACHMENT 2

## 30-DAY REPORTING OF 10 CFR 50.46 MARGIN UTILIZATION

**MILLSTONE POWER STATION UNIT 2**
**DOMINION NUCLEAR CONNECTICUT, INC.**

## 10 CFR 50.46 MARGIN UTILIZATION - SMALL BREAK LOCA

| | |
|---|---|
| **Plant Name:** | Millstone Power Station, Unit 2 |
| **Utility Name:** | Dominion Nuclear Connecticut, Inc. |

**Analysis Information**

| | |
|---|---|
| **EM:** | PWR SBLOCA, S-RELAP5 Based |
| **Limiting Break Size:** | 0.08 $ft^2$ |
| **Analysis Date:** | January 2002 |
| **Vendor:** | AREVA |
| **Peak Linear Power:** | 15.1 kW/ft |
| **Notes:** | None |

| | PCT (°F) | Delta PCT (°F) |
|---|---|---|
| **LICENSING BASIS** | | |
| Analysis of Record PCT | 1941 | |
| **PCT ASSESSMENTS (Delta PCT)** | | |
| **A. Prior ECCS Model Assessments** | | |
| 1. Decay Heat Model Error | | -133 |
| 2. Revised SBLOCA Guideline | | 0 |
| 3. Core Exit Modeling-Upper Tie Plate Flow Area | | -22 |
| 4. Point Kinetics Programming Issue with RELAP5-Based Computer Codes | | -8 |
| 5. S-RELAP5 Choked Flow Error with Non-Condensables Present | | 0 |
| 6. Radiation to Fluid Heat Transfer Model Change | | -64 |
| 7. RELAP5 Kinetics Coding Error | | 4 |
| 8. RELAP5 Heat Conduction Solution | | 0 |
| 9. RODEX2 Thermal Conductivity Degradation | | 0 |
| 10. Sleicher-Rouse Correlation Modeling | | 83 |
| **B. Planned Plant Modification Evaluations** | | |
| 1. None | | 0 |
| **C. Current ECCS Model Assessments** | | |
| 1. S-RELAP5 Vapor Absorptivity Correlation{1} | | 80 |
| **D. Other** | | |
| 1. None | | 0 |
| **LICENSING BASIS PCT + PCT ASSESSMENTS** | **PCT =** | **1881** |

**NOTES:**

{1} The current accumulation of changes for these items (sum of absolute magnitudes) since the last 30-day report or reanalysis is greater than or equal to 50°F and is significant, as defined in 10CFR50.46(a)(3)(i).