



**Northeast
Nuclear Energy**

Rope Ferry Rd. (Route 156), Waterford, CT 06385

Millstone Nuclear Power Station
Northeast Nuclear Energy Company
P.O. Box 128
Waterford, CT 06385-0128
(860) 447-1791
Fax (860) 444-4277

The Northeast Utilities System

MAR 23 2000

Docket No. 50-423
B18028

Re: 10 CFR 50.46(a)(3)(i)
10 CFR 50.46(a)(3)(ii)

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

**Millstone Nuclear Power Station, Unit No. 3
1999 Annual Reporting of Changes to, and Errors in,
Emergency Core Cooling System Models or Applications**

In accordance with 10 CFR 50.46(a)(3)(ii), Northeast Nuclear Energy Company (NNECO) hereby submits its annual summary of changes to the emergency core cooling system (ECCS) evaluation models or applications of those models for the period of January 1, 1999, to December 31, 1999. Based on a notification received from Westinghouse, dated February 23, 2000, the criteria identified under 10 CFR 50.46(a)(3)(i) has been exceeded for the small break loss of coolant accident (LOCA). As such, this report is being submitted to satisfy the 30-day requirement specified in 10 CFR 50.46(a)(3)(ii). The corrected PCTs in this report for the limiting small and large break LOCAs remain below the 2200 °F limit as defined by 10 CFR 50.46(b)(1).

The last annual update was submitted to the NRC Staff on March 29, 1999.⁽¹⁾

⁽¹⁾ R. P. Necci letter to U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 3, Annual Reporting of Changes to, and Errors in, Emergency Core Cooling System Models or Applications," B17726, dated March 29, 1999.

The following is a breakdown of the information provided in Attachment 1:

1. Westinghouse revised the SPIKE computer code to reflect more recent data generated using the current small break LOCA Evaluation Model and methodology. The SPIKE computer program and the associated methodology are used as an evaluation tool in the 10 CFR 50.46 plant licensing process to estimate fuel rod burst PCT penalties for small break LOCA analyses. The revision resulted in a 52 °F PCT penalty for small break LOCA.
 2. Westinghouse performed an evaluation to identify small break LOCA PCT margin in previously assigned model assessment and safety evaluation PCT allocations. This evaluation was based on a plant-specific calculation and current computer code versions. This evaluation resulted in a 51 °F margin recovery benefit in the small break LOCA analyses.
 3. Westinghouse identified errors in the LOCBART computer code relating to Spacer Grid Single Phase Heat Transfer and Zirc-Water Oxidation. These errors were addressed with plant-specific calculations using a corrected version of the LOCBART code. The calculations resulted in a large break LOCA PCT penalty of 41 °F.
 4. Westinghouse identified the following additional errors or changes in the ECCS Evaluation models which were evaluated to have a PCT impact of 0 °F:
 - a. LUCIFER2 Downcomer Azimuthal Flow Path Calculations
 - b. BASH Vapor Film Flow Regime Heat Transfer Error
 - c. BASH Broken Loop Accumulator Empty Time Logic Error
 - d. BASH Pumped Injection Spill Logic Error
 - e. LOCBART Pellet Diameter Adjustment Error
 - f. SPADES Truncation Error
 - g. NOTRUMP Array Boundary Error
 - h. NOTRUMP Volumetric/Mass Based Consistency Error
 - i. LOCBART Transient Termination
 - j. NOTRUMP Inconel-690 Tube Properties
 - k. Improved Code I/O and Diagnostics, and General Code Maintenance
- Since these errors or changes have a PCT impact of 0 °F, they will not be shown on the Margin Utilization Sheets provided in Attachment 1.
5. Considering the changes summarized in Attachment 1, the corrected PCTs for the limiting small and large break LOCAs remain below the 2200 °F limit as defined by 10 CFR 50.46(b)(1).

We believe that this information satisfies the 30-day reporting requirement of 10 CFR 50.46(a)(3)(ii) for a significant change, as well as the annual reporting of changes and errors in the ECCS evaluation models for the 1999 calendar year.

There are no regulatory commitments contained within this letter.

If you have any questions regarding this submittal, please contact Mr. D. Dodson at (860) 447-1791, Ext. 2346.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: Stephen E. Scace
Director - Nuclear Oversight and
Regulatory Affairs

BY: 

David A. Smith
Manager - Regulatory Affairs

Attachments (1)

cc: H. J. Miller, Region I Administrator
V. Nerses, NRC Senior Project Manager, Millstone Unit No. 3
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3

Docket No. 50-423
B18028

Attachment 1

Millstone Nuclear Power Station, Unit No. 3

1999 Annual Reporting of 10 CFR 50.46 Margin Utilization

March 2000

**1999 Annual Reporting of 10 CFR 50.46 Margin Utilization
 Small Break LOCA**

Plant Name: Millstone Unit No. 3
Utility Name: Northeast Nuclear Energy Company

Analysis Information

EM: NOTRUMP **Analysis Date:** 06/90 **Limiting Break Size:** 3 Inches
FQ: 2.6 **FΔH:** 1.7
Fuel: Vantage 5H **SGTP (%):** 10
Notes: None

	<u>Clad Temp (°F)</u>	<u>Notes</u>
LICENSING BASIS		
Analysis of Record PCT	1891	

MARGIN ALLOCATIONS (Δ PCT)

- | | |
|---|------|
| A. Prior Permanent ECCS Model Assessments | |
| 1. ECCS Evaluation Model Changes | 27 |
| 2. Effect of SI in Broken Loop | 150 |
| 3. Effect of Improved COSI (Condensation Model) | -150 |
| 4. Drift Flux Flow Regime Errors | -13 |
| 5. Average Rod Burst Strain | 14 |
| 6. Fuel Rod Burst Strain Limit | -14 |
| 7. LUCIFER Error Corrections | -16 |
| 8. Boiling Heat Transfer Correlation Error | -6 |
| 9. Steam Line Isolation Logic Error | 18 |
| 10. Axial Nodalization, RIP Model Revision, and
SBLOCTA Error Corrections Analysis | 26 |
| 11. NOTRUMP Specific Enthalpy Error | 20 |
| 12. SBLOCTA Fuel Rod Initialization Error | 10 |
| 13. MSSV 3% Setpoint Uncertainty Analysis | 67 |
| 14. AFW Purge Volume Error | 17 |
| B. 10 CFR 50.59 Safety Evaluations | |
| 1. Increased Pressurizer Pressure Uncertainty | 14 |
| 2. Effect of ZIRLO Fuel Cladding | 24 |
| 3. Fuel Rod Crud | 2 |
| 4. Reduced Thermal Design Flow | 12 |
| 5. Fuel Reconstitution | 1 |
| 6. Revised T-hot Average Scaling | 2 |
| C. 1999 10 CFR 50.46 Model Assessments
 (Permanent Assessment of PCT Margin) | |
| 1. Burst and Blockage/Time in Life
(SPIKE Correlation Revision) | 52 |
| D. Temporary ECCS Model Issues | |
| 1. None | 0 |

**1999 Annual Reporting of 10 CFR 50.46 Margin Utilization
Small Break LOCA (Continued)**

	<u>Clad Temp (°F)</u>	<u>Notes</u>
E. Other Margin Allocations		
1. Burst and Blockage/Time in Life	111	(1)
2. Axial Offset Decrease to +20%	-135	
3. Margin Recovery Benefit	-51	(2)
<hr/> LICENSING BASIS PCT + MARGIN ALLOCATIONS		PCT = 2073

Notes:

- (1) This assessment is a function of Base PCT plus permanent margin allocation and as such will increase/decrease with margin allocation changes.
- (2) Margin Recovery Benefit based in part on plant-specific PCT calculations that identify margin in Model Assessments and Safety Evaluations reported in Sections "A" and "B".

**1999 Annual Reporting of 10 CFR 50.46 Margin Utilization
 Large Break LOCA**

Plant Name: Millstone Unit No. 3
Utility Name: Northeast Nuclear Energy Company

Analysis Information

EM: BASH **Analysis Date:** 08/90 **Limiting Break Size:** Cd=0.6
FQ: 2.6 **FΔH:** 1.7
Fuel: Vantage 5H **SGTP (%):** 10
Notes: VH5/RFA

	<u>Clad Temp (°F)</u>	<u>Notes</u>
LICENSING BASIS		
Analysis of Record PCT	1974	
MARGIN ALLOCATIONS (Δ PCT)		
A. Prior Permanent ECCS Model Assessments		
1. None	0	
B. 10 CFR 50.59 Safety Evaluations		
1. Increased Pressurizer Pressure Uncertainty	1	
2. Effect of ZIRLO Fuel Cladding	6	
3. Reactor Vessel Flange Radiation Shield	1	
4. Reduced Thermal Design Flow	12	
5. Fuel Reconstitution	1	
6. Revised T-hot Average Scaling	7	
7. Robust Fuel Assembly Fuel Features	48	
C. 1999 10 CFR 50.46 Model Assessments (Permanent Assessment of PCT Margin)		
1. LOCBART Spacer Grid Single-Phase Heat Transfer Error, LOCBART Zirc-Water Oxidation Error, and LOCBART Reanalysis of Limiting AOR Case (9/99)	41	(1)
D. Temporary ECCS Model Issues		
1. None	0	
E. Other Margin Allocations		
1. Reanalysis of Limiting AOR Case	22	
LICENSING BASIS PCT + MARGIN ALLOCATIONS	PCT = 2113	

Notes:

- (1) The LOCBART reanalysis addressed the following issues: LOCBART Spacer Grid Single-Phase Heat Transfer Error and LOCBART Zirc-Water Oxidation Error. No prior rackup assessments were incorporated into the reanalysis.