



2807 West County Road 75  
Monticello, MN 55362

December 15, 2021

L-MT-21-068  
10 CFR 50.46(a)(3)(ii)

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

Monticello Nuclear Generating Plant  
Docket No. 50-263  
Renewed Facility Operating License No. DPR-22

2021 Annual Report of Changes in Emergency Core Cooling System Evaluation Models  
Pursuant to 10 CFR 50.46

References:

1. Correspondence, L-MT-20-045, Thomas A. Conboy to U.S. Nuclear Regulatory Commission, "2020 Annual Report of Changes in Emergency Core Cooling System Evaluation Models Pursuant to 10 CFR 50.46," December 16, 2020.
2. GNF Correspondence JMT-NMC-EK1-21-007, Jeanne Thome (GNF) to David Mienke (Xcel Energy), "Monticello 10 CFR 50.46 Reporting Period of July 2020 to July 2021," dated October 26, 2021.
3. GNF Notification Letter 2021-01 "Error in Fuel Pellet to Plenum Spring Conductance", GNF, February 18, 2021.
4. GNF Notification Letter 2021-02 "Discrepancy in Inner Cladding Surface Roughness" GNF, February 18, 2021.
5. Framatome Report FS1-0057936, Revision 1.0, "Monticello 10 CFR 50.46 PCT Reporting Estimates for ATRIUM 10XM Fuel Between September 2020 and September 2021," dated September 2021.
6. Framatome Condition Report 2021-1456, "Incorrect Parameters Input to Monticello ATRIUM 11 LOCA Database," Framatome, June 16, 2021.
7. Framatome Condition Report 2021-2025, "Corrections Implemented by the RDX2\_2\_RDX4 code for the TCD Factor calculation for the EXEM BWR-2000 LOCA Method," Framatome, September 2, 2021.
8. ANP-3720P Revision 0, "Monticello LOCA MAPLHGR Limits for EPU/EFW with ATRIUM 10XM Fuel and Revised Modeling Parameters," January 2019.

Pursuant to 10 CFR 50.46(a)(3)(ii), the Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, is providing this annual report concerning changes or errors identified in the Emergency Core Cooling System (ECCS) evaluation models for the Monticello Nuclear Generating Plant (MNGP).

GNF GE14 fuel and Framatome ATRIUM 10XM fuel are currently in the Monticello core. This report is for the period between July 2020 and July 2021.

The last annual report was transmitted on December 16, 2020 (Reference 1).

#### Global Nuclear Fuel GE14 Fuel

The Nuclear Analysis Department requested from the fuel vendor, Global Nuclear Fuel, any applicable 10 CFR 50.46 notification of errors or changes that have occurred during the reporting period from July 2020 to July 2021. Correspondence from Global Nuclear Fuel (Reference 2) noted that two new notifications (References 3 and 4) were made during this period.

Neither notification letter resulted in more than a 0°F change in PCT. Attached in Enclosure 1 is the peak cladding temperature (PCT) rack-up for GE 14 fuel for Monticello.

The current adjusted PCT of <2156°F remains the same as the one provided in Enclosure 1 of the 2020 Annual Report (Reference 1).

#### Framatome ATRIUM 10XM Fuel

Attached in Enclosure 2 is the peak cladding temperature (PCT) for Framatome ATRIUM 10XM fuel for Monticello.

The Nuclear Analysis Department requested from the fuel vendor, Framatome Inc., any applicable 10 CFR 50.46 notifications of errors or changes that have occurred during the reporting period from September 2020 to September 2021. Correspondence from Framatome Inc. (References 5, 6, and 7) identify the PCT changes during the September 2020 to September 2021 annual reporting period.

ANP-3720P (Reference 8) is the current analysis of record and provides a baseline for Framatome ATRIUM 10XM fuel at Monticello. During the September 2020 – September 2021 period, two errors were found with the Reference 8 Analysis of Record. Incorrect parameters were entered into the ATRIUM 11 LOCA database resulting in a 19°F PCT penalty (This error which was uncovered during ATRIUM 11 analysis also pertains to ATRIUM 10XM fuel). Details of this error can be found in reference 6. The second error was uncovered in September 2021. The error dealt with corrections implemented by the RDX-2\_RDX4 code for the TCD factor calculation for the EXEM BWR-2000 LOCA Method. This error resulted in a 0°F PCT change, details which can be found in Reference 7.

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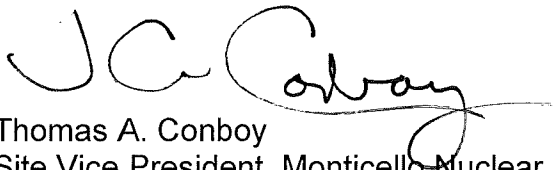
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The current total assessed changes and errors to the analysis of record (ANP-3720P) is 19°F, so the total PCT is 2144°F.

Should you have questions regarding this letter, please contact Mr. David Gerads at (763) 295-1046 (w) or (612) 669-4741 (c).

Summary of Commitments

This letter makes no new commitments and no revisions to existing commitments.

A handwritten signature in black ink, appearing to read "T A Conboy". The signature is fluid and cursive, with a long horizontal stroke extending from the end.

Thomas A. Conboy  
Site Vice President, Monticello Nuclear Generating Plant  
Northern States Power Company – Minnesota

Enclosure (2)

cc: Administrator, Region III, USNRC  
Project Manager, Monticello,  
USNRC Resident Inspector,  
Monticello, USNRC

**ENCLOSURE 1**

**MONTICELLO NUCLEAR GENERATING PLANT**

**TABLE 1 – SUMMARY OF MONTICELLO LOCA CHANGES AND ERRORS  
INVOLVING CHANGES IN PEAK CLADDING TEMPERATURE (PCT) FOR GE14  
FUEL**

**TABLE 1 – SUMMARY OF MONTICELLO LOCA CHANGES AND ERRORS INVOLVING CHANGES IN PEAK CLADDING TEMPERATURE (PCT) FOR GE14 FUEL**

<b>Applicable Analysis or Error/Change Description</b>	<b>Ref.</b>	<b>Licensing Basis PCT(°F) GE14</b>
NEDC-33322P, Revision 3, Safety Analysis Report for Monticello Constant Pressure Power Uprate	G1 & G2	<2140
PRIME Fuel Properties Implementation for Fuel Rod T/M Performance, replacing GESTR Fuel Properties (10 CFR 50.46 Notification Letter 2012-01, Revision 1)  This change is due to the application of an NRC-approved procedure to estimate the change in Peak Clad Temperature (PCT) due to the change in fuel properties from GESTR to PRIME primarily to address inaccuracies in fuel pellet thermal conductivity as a function of exposure.	G3	+10
SAFER04A E4-Mass Non-Conservatism (10 CFR 50.46 Notification Letter 2014-02)  This change is due to a logic error that occurs when upper plenum liquid mass and core spray flow rate are low. System mass is gradually lost due to core spray being discarded, resulting in marginally less ECCS flow credited as reaching the core.	G4	+15
SAFER04A E4-Minimum Core DP Model (10 CFR 50.46 Notification Letter 2014-03)  This change is due to the use of a minimum $\Delta p$ that could be non-conservative offering inappropriate steam cooling benefit above the core two- phase level.	G5	+20
SAFER04A E4-Bundle/Lower Plenum CCFL Head (10 CFR 50.46 Notification Letter 2014-04)  This change is due to the counter current flow limitation (CCFL) calculation representing the pressure head slightly different from that of the calculated water level in the bundle.	G6	-15
Modified performance characteristics of the RHR (LPCI) and core spray (LPCS) systems.	G8	-14
SAFER Lower Limit on Differential Pressure for Bypass Leakage	G9	0
PRIME Coding Errors for Zircaloy Irradiation Growth and Zr Barrier Thermal Conductivity as input to ECCS LOCA Analyses	G10	0
Error in Fuel Pellet to Plenum Spring Conductance	G11	0

**CHANGES IN PEAK CLADDING TEMPERATURE (PCT) FOR GE14 FUEL**  
**TABLE 1 – SUMMARY OF MONTICELLO LOCA CHANGES AND ERRORS INVOLVING**

<b>Applicable Analysis or Error/Change Description</b>	<b>Ref.</b>	<b>Licensing Basis PCT(°F) GE14</b>
Discrepancy in Inner Cladding Surface Roughness	G12	0
Sum of absolute value of changes since the last 10 CFR 50.46 report (Reference 2)		0
Sum of absolute value of changes since last AOR (Reference G1).		74
Algebraic sum of changes since the last 10 CFR 50.46 report (Reference 2)		0
Algebraic sum of changes since last AOR (Reference G1).		+16
<b>Current Adjusted Peak Cladding Temperature</b>		<2156

### References

- G1. GE Report: NEDC-33322P1 Revision 3, "Safety Analysis Report for Monticello Constant Pressure Power Uprate," dated October 2008 (Enclosure 5 of L-MT-08-052, dated November 5, 2008, ADAMS Accession No. ML083230111)
- G2. NSPM letter to NRC, "Monticello Extended Power Uprate and Maximum Extended Load Line Limit Analysis Plus License Amendment Requests: Supplement for Analytical Methods Used to Address Thermal Conductivity Degradation and Analytical Methods Limitations (TAC Nos. MD9990 and ME3145)," L-MT-13-053 dated July 8, 2013 (ADAMS Accession No. ML13191A568).
- G3. GEH 10 CFR 50.46 Notification Letter 2012-01, Revision 1, "PRIME Fuel Properties Implementation for Fuel Rod T/M Performance, replacing GESTR Fuel Properties," dated July 30, 2013.
- G4. GEH 10 CFR 50.46 Notification Letter 2014-02, "SAFER04A E4-Mass Non- Conservatism," dated May 21, 2014.
- G5. GEH 10 CFR 50.46 Notification Letter 2014-03, "SAFER04A E4-Minimum Core DP Model," dated May 21, 2014.
- G6. GEH 10 CFR 50.46 Notification Letter 2014-04, "SAFER04A E4-Bundle/Lower Plenum CCFL Head," dated May 21, 2014.
- G7. L-MT-14-101, letter from K. Fili (NSPM) to NRC "2014 Annual Report of Changes in Emergency Core Cooling System Evaluation Models Pursuant to 10 CFR 50.46," December 30, 2014.
- G8. GE Report 0000-0163-2998 R0 "Monticello ECCS LOCA Evaluation for Modified Low Pressure ECCS Injection Performance Curves (LPCS and LPCI)" dated July 25, 2013
- G9. GEH 10 CFR 50.46 Notification Letter 2019-05, "SAFER Lower Limit on Differential Pressure for Bypass Leakage", dated October 23, 2019.

- G10. GEH 10 CFR 50.46 Notification Letter 2020-01, "PRIME Coding Errors for Zircaloy Irradiation Growth and Zr Barrier Thermal Conductivity as input to ECCS LOCA Analyses", dated April 14, 2020.
- G11. GNF Notification Letter 2021-01 "Error in Fuel Pellet to Plenum Spring Conductance", dated February 18, 2021
- G12. GNF Notification Letter 2021-02 "Discrepancy in Inner Cladding Surface Roughness", February 18, 2021

**ENCLOSURE 2**

**MONTICELLO NUCLEAR GENERATING PLANT**

**TABLE 2 – SUMMARY OF MONTICELLO LOCA CHANGES AND ERRORS INVOLVING  
CHANGES IN PEAK CLADDING TEMPERATURE (PCT) FOR ATRIUM 10XM FUEL**

1 Page Follows



**TABLE 2 – SUMMARY OF MONTICELLO LOCA CHANGES AND ERRORS INVOLVING  
CHANGES IN PEAK CLADDING TEMPERATURE (PCT) FOR ATRIUM 10XM FUEL**

<b>Applicable Analysis or Error/Change Description</b>	<b>Ref.</b>	<b>Licensing Basis PCT(°F) 10XM</b>
ANP-3720P Revision 0, Monticello LOCA MAPLHGR Limits for EPU/EFW with ATRIUM 10XM Fuel and Revised Modeling Parameters <sup>(1)</sup>	A1	2125
FS1-0048088 Revision 0, Monticello 10 CFR 50.46 PCT Error Reporting – Heat-up Analysis Input and RODEX4 Routine Issues	A2	0
Framatome Condition Report 2021-1456 “Incorrect Parameters Input to Monticello ATRIUM 11 LOCA Database”.	A3	+19
RDX2_2_RDX4 Corrections	A4	0
Sum of absolute value of changes since the last 10CFR 50.46 report (Reference 2).		19
Sum of absolute value of changes since the last AOR (Reference A1)		19
Algebraic sum of changes since the last 10 CFR 50.46 report (Reference 1).		+19
Algebraic sum of changes since last AOR (Reference A1).		+19
<b>Current Adjusted Peak Cladding Temperature</b>		<b>2144</b>

(1) Framatome report ANP-3720P reflects a new LOCA analysis performed to provide a new baseline for Framatome ATRIUM 10XM fuel at MNGP as provided in Reference A1.

## References

- A1. ANP-3720P Revision 0, Monticello LOCA MAPLHGR Limits for EPU/EFW with ATRIUM 10XM Fuel and Revised Modeling Parameters, Framatome, January 2019
- A2. FS1-0048088 Revision 0, Monticello 10 CFR 50.46 PCT Error Reporting – Heatup Analysis Input and RODEX4 Routine Issues, Framatome, February 2020
- A3. Framatome Condition Report 2021-1456, “Incorrect Parameters Input to Monticello ATRIUM 11 LOCA Database,” Framatome, June 16, 2021
- A4. Framatome Condition Report 2021-2025, “Corrections Implemented by the RDX2\_2\_RDX4 code for the TCD Factor calculation for the EXEM BWR-2000 LOCA Method,” Framatome, September 2, 2021