



1717 Wakonade Drive  
Welch, MN 55089

June 16, 2022

L-PI-22-032  
10 CFR 50.46

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

Prairie Island Nuclear Generating Plant, Units 1 and 2  
Docket Nos. 50-282 and 50-306  
Renewed Facility Operating License Nos. DPR-42 and DPR-60

2021 10 CFR 50.46 LOCA Annual Report

References: 1) Westinghouse Letter NSPM-LOCA-TM-A5-000001 "Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2021, dated February 7, 2022

Pursuant to 10 CFR 50.46(a)(3)(ii), Northern States Power Company, a Minnesota corporation, doing business as Xcel Energy (hereafter "NSPM"), hereby submits the 2021 annual report of changes and errors associated with the Prairie Island Nuclear Generating Plant (PINGP), Units 1 and 2 Emergency Core Cooling System (ECCS) analyses (Enclosure 1).

PINGP has reviewed the above Reference, which addresses 10 CFR 50.46 reporting information pertaining to the Emergency Core Cooling System (ECCS) Evaluation Model changes that were implemented by Westinghouse for 2021. The review concludes that the effect of changes to, or errors in, the Evaluation Models on the limiting transient peak cladding temperature (PCT) is not significant for 2021 and remains unchanged from the 2020 annual report.

Enclosure 1 pages 3 through 4 provides an assessment of the specific changes and enhancements to the Westinghouse Evaluation Models for 2021. These model changes and enhancements do not have impacts on the PCT and, generally, will not be presented on the PCT rack-up forms.

Enclosure 1 pages 5 through 10 provides PCT rack-up forms for the calculated Large Break Loss-of-Coolant Accident (LOCA) and Small Break LOCA PCT margin allocations in effect for the 2021 PINGP Evaluation Models. The PCT values determined in the Large Break and Small Break LOCA analysis of record, combined with all of the PCT allocations, remain below the 10 CFR 50.46(b)(1) regulatory limit of 2200°F. Therefore, PINGP is in compliance with 10 CFR 50.46 requirements and no reanalysis or other action is required.

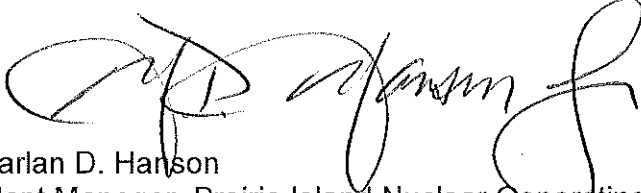
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If you have any questions about this submittal, please contact Carrie Seipp, Senior Regulatory Engineer, at 612-330-5576.

Summary of Commitments

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

A handwritten signature in black ink, appearing to read "Harlan D. Hanson", is written over the printed name and title.

Harlan D. Hanson  
Plant Manager, Prairie Island Nuclear Generating Plant  
Northern States Power Company – Minnesota

Enclosure (1)

cc: Administrator, Region III, USNRC  
Project Manager, Prairie Island, USNRC  
Resident Inspector, Prairie Island, USNRC

ENCLOSURE 1

Westinghouse Letter NSPM-LOCA-TM-A5-000001 "Prairie Island Units 1 and 2  
10 CFR 50.46 Annual Notification and Reporting for 2021"



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Our ref: NSPM-LOCA-TM-A5-000001

**Prairie Island Units 1 and 2**  
**10 CFR 50.46 Annual Notification and Reporting for 2021**

Dear Sir or Madam:

This is a notification of 10 CFR 50.46 reporting information pertaining to the Westinghouse Electric Company Evaluation Models/analyses. As committed to in WCAP-13451, Westinghouse Methodology for Implementation of 10 CFR 50.46 Reporting, Westinghouse is providing an Annual Report for Emergency Core Cooling System (ECCS) Evaluation Model changes and errors for the 2021 model year. All necessary standardized reporting pages for any changes and errors for the Evaluation Models utilized for your plant(s) are enclosed, consistent with the commitment following the NUPIC audit in early 1999. Peak Clad Temperature (PCT) summary sheets are enclosed. All necessary revisions for any non-zero, non-discretionary PCT changes have been included. Changes with estimated PCT impacts of 0°F may not be presented on the PCT summary sheet. The Evaluation Model changes and errors (except any plant-specific errors in the application of the model) have been provided to the NRC via Westinghouse letter.

This information is for your use in making a determination relative to the reporting requirements of 10 CFR 50.46. The information that is provided in this letter was prepared in accordance with Westinghouse's Quality Management System (QMS). Please contact your LOCA plant cognizant engineer (PCE), Julie L. Hartz (412-374-2321), if there are any questions concerning this information.

Author: (Electronically Approved)\*  
Heather McMillen

Verified: (Electronically Approved)\*  
Julie L. Hartz

Approved: (Electronically Approved)\*  
Amy J. Colussy

Attachment: 10 CFR 50.46 Reporting Text and PCT Summary Sheets (9 Pages)

*\*Electronically approved records are authenticated in the electronic document management system.*

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Enclosure 1

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## **GENERAL CODE MAINTENANCE**

### **Background**

Various changes have been made to enhance the usability of codes and to streamline future analyses. Examples of these changes include improving the input diagnostic checks; enhancing the code output; optimizing active coding; and eliminating inactive coding. These changes represent Discretionary Changes that will be implemented on a forward-fit basis in accordance with Section 4.1.1 of WCAP-13451.

### **Affected Evaluation Model(s)**

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

2004 Westinghouse Realistic Large Break LOCA Evaluation Model Using ASTRUM

### **Estimated Effect**

The nature of these changes leads to an estimated peak cladding temperature impact of 0°F.

## **REDUCTION IN FLOW AREA TO THE BOTTOM OF THE BARREL/BAFFLE REGION**

### **Background**

For plants without holes in the edge of the lower core plate, the flow area from the bottom of the core to the barrel/baffle region has historically been modeled as the gap between the baffle plate and the lower core plate, and this flow area did not consider the reduced flow area due to the presence of the bottom nozzle flow skirt. The impact of reducing the flow area between the core and barrel baffle region due to including the bottom nozzle flow skirt has been qualitatively evaluated. This item represents a Non-Discretionary Change in accordance with Section 4.1.2 of WCAP-13451.

### **Affected Evaluation Model(s)**

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

### **Estimated Effect**

The evaluation determined that considering a reduced flow area from the bottom of the core to the barrel/baffle region when considering the bottom nozzle flow skirt has a negligible effect on the SBLOCA analysis results, leading to an estimated peak cladding temperature (PCT) impact of 0°F.

### LOCA Peak Cladding Temperature (PCT) Summary

**Plant Name:** PRAIRIE ISLAND 1  
**EM:** NOTRUMP  
**AOR Description:** Appendix K Small Break  
**Summary Sheet Status:** Current

	PCT (°F)	Reference #	Note #
ANALYSIS-OF-RECORD	959	1	

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AOR + ASSESSMENTS	PCT = 959.0 °F
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#### REFERENCES

- 1 LTR-LIS-08-158, "Transmittal of Future Prairie Island Units 1 and 2 PCT Summaries," February 2008.

#### NOTES:

- (a) None

**Version: PRAIRIE ISLAND 1 NSP\_LOCA-50.46\_NSP\_Base\_Appendix\_K\_SBLOCA – 1.2 V.V**

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Enclosure 1

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**LOCA Peak Cladding Temperature (PCT) Summary**

**Plant Name:** PRAIRIE ISLAND 1  
**EM:** ASTRUM (2004)  
**AOR Description:** Best Estimate Large Break  
**Summary Sheet Status:** IFBA/Gad

	PCT (°F)	Reference #	Note #
<b>ANALYSIS-OF-RECORD</b>	1765	1	

<b>ASSESSMENTS*</b>	<b>Delta PCT (°ΔF)</b>	<b>Reference #</b>	<b>Note #</b>	<b>Reporting Year**</b>
1. Revised Heat Transfer Multiplier Distributions	-2	3		2013
2. Error in Burst Strain Application	25	4		2013
3. Evaluation of the Introduction of IFBA Fuel	0	2		2018
4. Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	227	5	(a)	2012

**AOR + ASSESSMENTS PCT = 2015.0 °F**

\* The licensee should determine the reportability of these assessments pursuant to 10 CFR 50.46.

\*\* The "Reporting Year" refers to the annual reporting year in which this assessment was included.

**REFERENCES**

- 1 WCAP-17783-P, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for Prairie Island Units 1 and 2 with Replacement Steam Generators Using ASTRUM Methodology," June 2013.
- 2 LTR-LIS-15-287, Rev. 1, "Prairie Island Units 1 and 2, 10 CFR 50.46 Notification and Reporting for the Revised Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown Evaluation and the Introduction of IFBA Fuel," September 2015.
- 3 LTR-LIS-13-366, Revision 1, "Prairie Island Units 1 and 2 10 CFR 50.46 Report for Revised Heat Transfer Multiplier Distributions," August 2013.
- 4 LTR-LIS-14-50, "Prairie Island Units 1 and 2 10 CFR 50.46 Report for the HOTSPOT Burst Strain Error Correction," January 2014.
- 5 LTR-LIS-12-414, "Prairie Island Units 1 and 2, 10 CFR 50.46 Notification and Reporting for Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown," September 2012.

**Version: PRAIRIE ISLAND 1 NSP\_LOCA-50.46\_NSP\_IFBA\_GAD\_ASTRUM – 1.3 V.V**



**NOTES:**

- (a) This evaluation credits peaking factor burndown, see Reference 5.

**Version: PRAIRIE ISLAND 1 NSP\_LOCA-50.46\_NSP\_IFBA\_GAD\_ASTRUM – 1.3 V.V**

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Enclosure 1

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**LOCA Peak Cladding Temperature (PCT) Summary**

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**Plant Name:** PRAIRIE ISLAND 2  
**EM:** NOTRUMP  
**AOR Description:** Appendix K Small Break  
**Summary Sheet Status:** Current

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	PCT (°F)	Reference #	Note #
ANALYSIS-OF-RECORD	959	1,2	a

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<b>AOR + ASSESSMENTS</b>	<b>PCT =</b> 959.0 °F
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**REFERENCES**

- 1 LTR-LIS-08-158, "Transmittal of Future Prairie Island Units 1 and 2 PCT Summaries," February 2008.
- 2 LTR-LIS-13-274, "Prairie Island Units 1 and 2, 10 CFR 50.46 Summary Sheets for the Evaluation to Support the Unit 2 Installation of AREVA Model 56/19 Replacement Steam Generators (RSGs)," June 2013.

**NOTES:**

- (a) The Unit 1 AOR is applicable to Unit 2 with the RSGs installed.

**Version: PRAIRIE ISLAND 2 NRP\_LOCA-50.46\_NRP\_Base\_Appendix\_K\_SBLOCA – 1.2 V.V**

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Enclosure 1

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**LOCA Peak Cladding Temperature (PCT) Summary**

**Plant Name:** PRAIRIE ISLAND 2  
**EM:** ASTRUM (2004)  
**AOR Description:** Best Estimate Large Break  
**Summary Sheet Status:** IFBA/Gad

	PCT (°F)	Reference #	Note #
<b>ANALYSIS-OF-RECORD</b>	1765	1	

<b>ASSESSMENTS*</b>	<b>Delta PCT (°ΔF)</b>	<b>Reference #</b>	<b>Note #</b>	<b>Reporting Year**</b>
1. Revised Heat Transfer Multiplier Distributions	-2	3		2013
2. Error in Burst Strain Application	25	4		2013
3. Evaluation of the Introduction of IFBA Fuel	0	2		2019
4. Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	227	5	(a),(b)	2012

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**AOR + ASSESSMENTS**                      **PCT = 2015 °F**

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\* The licensee should determine the reportability of these assessments pursuant to 10 CFR 50.46.

\*\* The "Reporting Year" refers to the annual reporting year in which this assessment was included.

**REFERENCES**

- 1 WCAP-17783-P, "Best-Estimate Analysis of the Large-Break Loss-of-Coolant Accident for Prairie Island Units 1 and 2 with Replacement Steam Generators Using ASTRUM Methodology," June 2013.
- 2 LTR-LIS-15-287, Rev. 1, "Prairie Island Units 1 and 2, 10 CFR 50.46 Notification and Reporting for the Revised Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown Evaluation and the Introduction of IFBA Fuel," September 2015.
- 3 LTR-LIS-13-366, Revision 1, "Prairie Island Units 1 and 2 10 CFR 50.46 Report for Revised Heat Transfer Multiplier Distributions," August 2013.
- 4 LTR-LIS-14-50, "Prairie Island Units 1 and 2 10 CFR 50.46 Report for the HOTSPOT Burst Strain Error Correction," January 2014.
- 5 LTR-LIS-12-414, "Prairie Island Units 1 and 2, 10 CFR 50.46 Notification and Reporting for Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown," September 2012.

**Version: PRAIRIE ISLAND 2 NRP\_LOCA-50.46\_NRP\_IFBA\_GAD\_ASTRUM – 1.5 V.V**

**NOTES:**

- (a) This evaluation credits peaking factor burndown, see Reference 5.
- (b) The reporting text and line item originally identified for Unit 1 in Reference 5 is applicable to Unit 2 with RSGs.

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**10 CFR 50.46 Reporting SharePoint Site Check:**

**EMs applicable to Prairie Island:**

**Realistic Large Break – ASTRUM (2004)**

**Appendix K Small Break – NOTRUMP**

**2021 Issues**

<b>Transmittal Letter</b>	<b>Issue Description</b>
None	None