



JUN 22 2016

L-PI-16-051  
10 CFR 50.46

U S Nuclear Regulatory Commission  
ATTN: Document Control Desk  
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

10 CFR 50.46 ECCS Annual Report

References: 1) K. Davison, PINGP, letter to NRC Document Control Desk,  
2014 10 CFR 50.46 LOCA Annual Report, L-PI-15-061, 6/30/2015  
(ADAMS Accession No. ML15181A080)

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

The limiting loss of coolant accident (LOCA) analysis for PINGP Units 1 and 2 is the large break LOCA (LBLOCA) analysis. The peak cladding temperature (PCT) for the LBLOCA analysis is unchanged for PINGP Units 1 and 2 since the last annual report (Reference 1).

Summary of Commitments

This letter contains no new commitment and no revision to an existing commitment.

A handwritten signature in black ink, appearing to read 'Scott Northard'.

Scott Northard  
Acting Site Vice President, Prairie Island Nuclear Generating Plant  
Northern States Power Company - Minnesota

Enclosure (1)

cc: Regional Administrator, Region III, USNRC  
Project Manager, Prairie Island Nuclear Generating Plant, USNRC  
Resident Inspector, Prairie Island Nuclear Generating Plant, USNRC

**ENCLOSURE 1**

**10 CFR 50.46 LOCA Annual Report**

**8 pages follow**



Westinghouse Electric Company  
Engineering Center of Excellence  
1000 Westinghouse Drive  
Cranberry Township, Pennsylvania 16066  
USA

Direct tel: (412) 374-5598  
e-mail: mcmillh@westinghouse.com

Our ref: LTR-LIS-16-40

February 18, 2016

**Prairie Island Units 1 and 2  
10 CFR 50.46 Annual Notification and Reporting for 2015**

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 2015 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) sheets are enclosed. All necessary revisions for any non-zero, non-discretionary PCT change to Section C have been included. Non-discretionary PCT impacts of 0°F will generally not be presented on the PCT sheet. Any plant-specific errors in the application of the model for 2015 will also be provided in Section C with discussion enclosed or cited. The Evaluation Model changes and errors (except any plant-specific errors in the application of the model) will be 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), Danial Utley (412-374-6663), if there are any questions concerning this information.

Author: (Electronically Approved)\*  
Heather McMillen  
LOCA Integrated Services II

Verified: (Electronically Approved)\*  
Danial W. Utley  
LOCA Integrated Services II

Approved: (Electronically Approved)\*  
Matthew B. Cerrone  
Manager, LOCA Integrated Services II

Attachment: 10 CFR 50.46 Reporting Text and PCT Summary Sheets (7 Pages)

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

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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 modifying input variable definitions, units and defaults; 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

### **Estimated Effect**

The nature of these changes leads to an estimated Peak Cladding Temperature (PCT) impact of 0°F.

## **PRAIRIE ISLAND UNIT 1 EARLIER CONTAINMENT SPRAY ACTUATION TIMES DUE TO DEGRADED FAN COOLER HEAT REMOVAL CAPACITY**

### **Background**

Due to the design of the Prairie Island emergency core cooling system (ECCS), a complete interruption in high head safety injection (HHSI) flow can occur during the switchover to sump recirculation for the small break loss-of-coolant accident (SBLOCA) transient. The Prairie Island Unit 1 SBLOCA analysis of record (AOR) models the actuation timing of the containment spray system based on containment pressurization calculations for the smaller break sizes considered therein (1.5-inch and 2-inch breaks). This ultimately dictates the timing of the switchover to sump recirculation and corresponding HHSI flow interruption.

Prairie Island Unit 1 identified a potential degradation in containment fan cooler heat removal capacity. Updated containment pressurization calculations result in earlier containment spray actuation times due to the degraded heat removal capacity of the fan coolers.

This scenario is characterized as a change in plant configuration, distinguished from an evaluation model change in Section 4 of WCAP-13451.

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

1985 Westinghouse Small Break LOCA Evaluation Model with NOTRUMP

### **Estimated Effect**

When considering the reduced heat transfer capability of the fan coolers, the containment spray pumps actuate earlier than modeled in the AOR for the 1.5-inch and 2-inch breaks; however, the interruption during the switchover to sump recirculation still occurs after the core has recovered. There is sufficient reactor coolant system inventory during the flow interruption such that a post-switchover core uncover would not occur. Therefore, this issue is estimated as a 0°F peak cladding temperature (PCT) impact on the Prairie Island Unit 1 SBLOCA AOR.

**Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break****Plant Name:** Prairie Island Unit 1**Utility Name:** Xcel Energy, Inc**Revision Date:** 2/1/2016**Analysis Information****EM:** ASTRUM (2004)      **Analysis Date:** 11/30/2007      **Limiting Break Size:** Split**FQ:** 2.5      **FdH:** 1.77**Fuel:** 422 Vantage +      **SGTP (%):** 10**Notes:**

	Clad Temp (°F)	Ref.	Notes
<b>LICENSING BASIS</b>			
<b>Analysis-Of-Record PCT</b>	1765	1	
<b>PCT ASSESSMENTS (Delta PCT)</b>			
<b>A. PRIOR ECCS MODEL ASSESSMENTS</b>			
1 . Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	227	2	(a)
2 . Revised Heat Transfer Multiplier Distributions	-2	3	
3 . Error in Burst Strain Application	25	4	
<b>B. PLANNED PLANT MODIFICATION EVALUATIONS</b>			
1 . None	0		
<b>C. 2015 ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>D. OTHER*</b>			
1 . None	0		

**LICENSING BASIS PCT + PCT ASSESSMENTS****PCT =** 2015

\* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

**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-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 20, 2012.
- 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.

**Notes:**

- (a) This evaluation credits peaking factor burndown, see Reference 2.

**Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break****Plant Name:** Prairie Island Unit 1**Utility Name:** Xcel Energy, Inc**Revision Date:** 2/1/2016**Analysis Information****EM:** NOTRUMP **Analysis Date:** 1/21/2008 **Limiting Break Size:** 3 inch**FQ:** 2.5 **FdH:** 1.77**Fuel:** 422 Vantage + **SGTP (%):** 10**Notes:** Zirlo® (14X14), Framatome RSG

	Clad Temp (°F)	Ref.	Notes
<b>LICENSING BASIS</b>			
<b>Analysis-Of-Record PCT</b>	959	1	
<b>PCT ASSESSMENTS (Delta PCT)</b>			
<b>A. PRIOR ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>B. PLANNED PLANT MODIFICATION EVALUATIONS</b>			
1 . None	0		
<b>C. 2015 ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>D. OTHER*</b>			
1 . None	0		
<b>LICENSING BASIS PCT + PCT ASSESSMENTS</b>	<b>PCT =</b> 959		
* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.			

**References**

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

**Notes:**

None



**Westinghouse LOCA Peak Clad Temperature Summary for ASTRUM Best Estimate Large Break****Plant Name:** Prairie Island Unit 2**Utility Name:** Xcel Energy, Inc**Revision Date:** 2/1/2016**Analysis Information****EM:** ASTRUM (2004) **Analysis Date:** 11/30/2007 **Limiting Break Size:** Split**FQ:** 2.5 **FdH:** 1.77**Fuel:** 422 Vantage + **SGTP (%):** 10**Notes:**

	Clad Temp (°F)	Ref.	Notes
<b>LICENSING BASIS</b>			
<b>Analysis-Of-Record PCT</b>	1765	1	
<b>PCT ASSESSMENTS (Delta PCT)</b>			
<b>A. PRIOR ECCS MODEL ASSESSMENTS</b>			
1 . Evaluation of Fuel Pellet Thermal Conductivity Degradation and Peaking Factor Burndown	227	2	(a), (b)
2 . Revised Heat Transfer Multiplier Distributions	-2	3	
3 . Error in Burst Strain Application	25	4	
<b>B. PLANNED PLANT MODIFICATION EVALUATIONS</b>			
1 . None	0		
<b>C. 2015 ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>D. OTHER*</b>			
1 . None	0		

**LICENSING BASIS PCT + PCT ASSESSMENTS** **PCT =** 2015

\* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.

**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-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 20, 2012.
- 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.

**Notes:**

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

**Westinghouse LOCA Peak Clad Temperature Summary for Appendix K Small Break****Plant Name:** Prairie Island Unit 2**Utility Name:** Xcel Energy, Inc**Revision Date:** 2/1/2016**Analysis Information****EM:** NOTRUMP**Analysis Date:** 1/21/2008**Limiting Break Size:** 3 inch**FQ:** 2.5**FdH:** 1.77**Fuel:** 422 Vantage +**SGTP (%):** 10**Notes:** Zirlo® (14X14), AREVA RSG

	Clad Temp (°F)	Ref.	Notes
<b>LICENSING BASIS</b>			
<b>Analysis-Of-Record PCT</b>	959	1, 2	a
<b>PCT ASSESSMENTS (Delta PCT)</b>			
<b>A. PRIOR ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>B. PLANNED PLANT MODIFICATION EVALUATIONS</b>			
1 . None	0		
<b>C. 2015 ECCS MODEL ASSESSMENTS</b>			
1 . None	0		
<b>D. OTHER*</b>			
1 . None	0		
<b>LICENSING BASIS PCT + PCT ASSESSMENTS</b>	<b>PCT =</b>	<b>959</b>	
* It is recommended that the licensee determine if these PCT allocations should be considered with respect to 10 CFR 50.46 reporting requirements.			

**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.

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

**EMs applicable to Prairie Island:**

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

**Appendix K Small Break – NOTRUMP**

**2015 Issues**

<b>Transmittal Letter</b>	<b>Issue Description</b>
LTR-LIS-16-60	10 CFR 50.46 Report for Earlier Containment Spray Pump Actuation Times due to Degraded Fan Cooler Heat Removal Capacity