

AUG 30 2005

L-PI-05-079  
10 CFR 50.46

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

Prairie Island Nuclear Generating Plant Units 1 and 2  
Dockets 50-282 and 50-306  
License Nos. DPR-42 and DPR-60

Corrections to Emergency Core Cooling System (ECCS) Evaluation Models

References: (1) Letter L-PI-04-111, dated September 24, 2004, "Clarification of Actions for Corrections to Emergency Core Cooling System (ECCS) Evaluation Models," from Nuclear Management Company, LLC (NMC), to the Nuclear Regulatory Commission (NRC)  
(2) Letter, dated March 2, 2005, "Prairie Island Nuclear Generating Plant, Units 1 and 2 – Corrections to Emergency Core Cooling System (ECCS) Evaluation Models Re: (TAC Nos. MC4643 and MC4644) from NRC to NMC

Attached is a report of changes to the Prairie Island Nuclear Generating Plant (PINGP) Emergency Core Cooling System (ECCS) Evaluation Models. This report is being submitted in accordance with the provisions of 10 CFR 50, Section 50.46, as a 30-day report.

The report includes Large Break Loss of Coolant Accident (LBLOCA) changes reported by Westinghouse. There were no changes to the Small Break Loss of Coolant Accident (SBLOCA) analysis.

The Unit 1 LBLOCA Peak Clad Temperature (PCT) change is due to a model application error designated as "SECY Cold Leg Nozzle Expansion." The change since the last PCT submitted to the NRC on December 14, 2004 is +13 °F. The PCT (2039 °F, see Attachment 1) for LBLOCA analysis continues to remain below the 10 CFR 50.46 PCT acceptance criterion. However, the accumulated absolute value of the PCT changes and errors since the original 1995 baseline Analysis of Record is 795 °F.

The Unit 2 LBLOCA Peak Clad Temperature (PCT) changes are due to the following three changes:

- A model application error designated as "SECY Cold Leg Nozzle Expansion" (+13 degree penalty)

- A change associated with a reactor head assembly upgrade completed during the Spring 2005 refueling outage (+3 degree penalty)
- An adjustment for the Cycle 23 initial core burnup, which was greater than assumed in the Safety Analysis Transition Program (SATP) (+7 degree penalty)

The Unit 2 changes since the last PCT submitted to the NRC on August 5, 2004 add to +23 °F. The PCT (2017 °F, see Attachment 1) for LBLOCA analysis continues to remain below the 10 CFR 50.46 PCT acceptance criterion. However, the accumulated absolute value of the PCT changes and errors since the original 1995 baseline Analysis of Record is 773 °F.

NMC has committed by letter (see Reference 1) to provide a new LBLOCA analysis for PINGP by March 31, 2006. The NRC found this schedule acceptable (see Reference 2).

The summary sheets attached to this letter need not be withheld from public disclosure.

#### Summary of Commitments

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



Thomas J. Palmisano  
Site Vice President, Prairie Island Nuclear Generating Plant

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

Enclosure

## **ENCLOSURE**

### **LOCA Peak Clad Temperature Summaries Prairie Island Nuclear Generating Plant**

(includes plant specific changes and non-zero non-plant specific changes)

10 Pages Follow

(Attachment 1 - Prairie Island Unit 1 LBLOCA – 5 pages)

(Attachment 2 - Prairie Island Unit 2 LBLOCA – 5 pages)

**Westinghouse LOCA Peak Clad Temperature Summary for SECY UPI Large Break**

**Plant Name:** Prairie Island Unit 1  
**Utility Name:** Nuclear Management Company, LLC  
**Revision Date:** 7/29/05

**Analysis Information**

**EM:** SECY UPI WC/T      **Analysis Date:** 3/1/95      **Limiting Break Size:** Cd = 0.4  
**FQ:** 2.4      **FdH:** 1.77  
**Fuel:** OFA      **SGTP (%):** 15  
**Notes:** Zirlo™, OSG SGTP Evaluated up to 24.64% (see also Note f); Fq increased to 2.5 (Item A.10); RSG Study at 10% SGTP.

	Clad Temp (°F)	Ref.	Notes
<b>LICENSING BASIS</b>			
<b>Analysis-Of-Record PCT</b>	2180	1,2	(a)
<b>MARGIN ALLOCATIONS (Delta PCT)</b>			
<b>A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS</b>			
1 . Fixed Heat Transfer Node Assignment Error/Accumulator Water Injection Error (1995 Report)	-175	3	
2 . 1-D Transition Boiling Heat Transfer Error (1997 Report)	59	5	
3 . Vessel Channel DX Error (1997 Report)	-14	5	
4 . Input Consistency (1997 Report)	-66	5	
5 . No Items for 1996 & 1998 Reports	0	4,6	
6 . Accumulator Line/Pressurizer Surge Line Data / Plant Specific Accumulator Level & Line Volume / Plant Specific Restart Error: Reanalysis (1999 Report)	113	7	(b)
7 . Modeling Updates and Unheated Conductor Input Corrections (Plant Specific, 2000 Report)	-147	8,10	(c)
8 . Accumulator Pressure +/- 30 psi Range (Plant Specific, 2001 Report)	8	12, 13	(d)
9 . LHSI Error Evaluation (Plant Specific, 2002 Report)	30	14, 15	(h)
10 . Sensitivity Study for FQ=2.5, LHSI Correction, etc. (as listed in note (g)) (Plant Specific, 2003 Report)	-47	17,19,20	(g,i)
11 . Broken Loop Nozzle Loss Coefficient (Plant Specific) (2003 Report)	-19	19,20,22, 26	(i)
<b>B. PLANNED PLANT CHANGE EVALUATIONS</b>			
1 . Sensitivity Study for Steam Generator Tube Plugging Increase to 25%	52	8	
2 . Accumulator Water Volume +/- 25 ft3 Range	12	12	
3 . Accumulator Pressure Extended to +/- 55 psi Range	21	12	
4 . 5 Reconstituted Rods Evaluation	0	9,11	(e)

5 . SATP Core Average Burnup	17	21,23
6 . Sensitivity Study for Framatome RSG	32	24
7 . HAUP LOCA Evaluation	3	25 *
<b>C. 2005 PERMANENT ECCS MODEL ASSESSMENTS</b>		
1 . SECY Cold Leg Nozzle Expansion	13	26

\* The 3°F penalty for the Head Assembly Upgrade Project (HAUP) will not be effective until the new head assembly is installed in the Spring of 2006. Therefore, this 3°F penalty will not be included in this summary of changes and errors through 8/10/05.

led  
8/10/05

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**Westinghouse LOCA Peak Clad Temperature Summary for SECY UPI Large Break**

**Plant Name:** Prairie Island Unit 1  
**Utility Name:** Nuclear Management Company, LLC  
**Revision Date:** 7/29/05

**D. TEMPORARY ECCS MODEL ISSUES\***

1 . None 0

**E. OTHER**

1 . Removal of Reference 14 LHSI Error Evaluation -30 17 (h)

**LICENSING BASIS PCT + MARGIN ALLOCATIONS**

PCT = 2042

(2039)

*see note on the previous page. dit siglas*

\* It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

**References:**

- 1 . 95NS-G-0021, "Updated UPI LBLOCA." March 24, 1995.
- 2 . WCAP-13919, Addendum 1. "Prairie Island Units 1 and 2 WCOBRA/TRAC Best Estimate UPI Large Break LOCA Analysis Engineering Report Addendum 1: Updated Results." December 1996.
- 3 . NSP-96-202, "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting." February 20, 1996.
- 4 . NSP-97-201, "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting." April 17, 1997.
- 5 . NSP-98-012, "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 1997." February 27, 1998.
- 6 . NSP-99-010, "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 1998." April 29, 1999.
- 7 . NSP-00-005, "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 1999." February 2000.
- 8 . NSP-00-057, "Northern States Power Company Prairie Island Units 1 and 2 LOCA Evaluation of 25% SGTP with Other Modeling Updates." December 11, 2000.
- 9 . 00NS-G-0076/CAB-00-390, "Prairie Island Unit 1 Cycle 21 LOCA Reload Confirmation and FCEP Checklist," December 15, 2000.
- 10 . NSP-01-006, "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2000." March 6, 2001.
- 11 . Rothrock (NMC) to Swigat (W), "Prairie Island Unit 1 LOCA PCT." May 30, 2001.
- 12 . NSP-02-9, "Nuclear Management Company Prairie Island Units 1 and 2 LBLOCA Accumulator Pressure and Volume Ranges Evaluation." February 15, 2002.
- 13 . NSP-02-5, "Nuclear Management Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2001." March 2002.
- 14 . NSP-02-59/LTR-ESI-02-194, "Final Evaluation of Large Break LOCA Error." December 2002.

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NSP-05-191

- 15 . NSP-03-19. "Nuclear Management Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2002," March 2003.
- 16 . MP92-TAH-0394 / ET-NSL-OPL-I-92-518, "NSPC Prairie Island Units 1 and 2, SG Tube Flow Area Reduction under LOCA / SSE - Final Report". October 21, 1992.
- 17 . NSP-04-10 "Safety Analysis Transition Program Transmittal of Engineering Report." February 20, 2004.
- 18 . NSP-93-513, Rev 1/ET-NSL-OPL-I-93-313, Rev. 1, Letter from T. A. Hawley (W) to K. E. Higar (NSP), "Final Transmittal of Assumptions to be used for the Large and Small Break LOCA Analyses, Rev. 1", July 7, 1993. Confirmed by : Letter from K. E. Higar (NSP) to Mr. T. Hawley (W), "Acceptance of NSP 93 513, Rev. 1". July 30, 1993.
- 19 . NSP-04-38. "Nuclear Management Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2003," March 2004.
- 20 . WCAP-16206-P, "SATP Engineering Report for Prairie Island," February 2004.

**Westinghouse LOCA Peak Clad Temperature Summary for SECY UPI Large Break**

**Plant Name:** Prairie Island Unit 1  
**Utility Name:** Nuclear Management Company, LLC  
**Revision Date:** 7 /29/05

- 21 . NF-NMC-04-49, "Nuclear Management Company Prairie Island Unit 1 Cycle 22 Final RSE," April 2004.
- 22 . NSP-04-65, "Nuclear Management Company Prairie Island Units 1 & 2 Safety Analysis Transition Program Response to 10 CFR 50.46 Inquiry," April 21, 2004.
- 23 . NF-NMC-04-129, "Nuclear Management Company Prairie Island Unit 1, Cycle 23 Final RSE," August 2004.
- 24 . NSP-04-114, "Nuclear Management Company Prairie Island Units 1 & 2, Safety Analysis Transition Program, Transmittal of LBLOCA Replacement Steam Generator (RSG) Engineering Report Addendum." (WCAP-16206-P-Addendum 1). June
- 25 . NSP-05-155, "Nuclear Management Company, Reactor Vessel Head Replacement Project. Prairie Island Units 1 & 2." May 18, 2005.
26. Misc. SECY Error Transmittal. August 2005.

**Notes:**

- (a) P-bar-HA increased from 1.57 to 1.59
- (b) *Reanalysis for all listed issues*
- (c) *Reanalysis for both issues*
- (d) *Related JCO in existence (NSP-01-030). NMC cognizant of uncertainty application and PCT sheet categorization.*
- (e) *Reconstitution for Cycle 21 recanted per Reference 11.*
- (f) *It is assumed that NMC is applying the 0.36% SGTP allowance factor branch of the SG LOCA / SSE issue (Reference 16). Thus the 25% SGTP Study (Item B.1) supports a net SGTP limit of 24.64%.*
- (g) *Sensitivity Study for: FQ=2.50, PAD 4.0 Implementation, Restoration of LHSI to Reference 18 values, SG/Loop ΔP Re-tuning, Core Power Restoration.*
- (h) *The note (g) sensitivity study allows for the removal of the Reference 14 engineering assessment.*
- (i) *Items A.10 and A.11 presented as aggregate -66 °F entry prior to Reference 22 decomposition.*



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**Westinghouse LOCA Peak Clad Temperature Summary for SECY UPI Large Break**

**Plant Name:** Prairie Island Unit 2  
**Utility Name:** Nuclear Management Company, LLC  
**Revision Date:** 7 /29/05

Analysis Information

**EM:** SECY UPI WC/T      **Analysis Date:** 3/1/95      **Limiting Break Size:** Cd = 0.4  
**FQ:** 2.4      **FdH:** 1.77  
**Fuel:** OFA      **SGTP (%):** 15  
**Notes:** Zirlo™, SGTP Evaluated up to 24.64% (see also Note e); Fq increased to 2.5 (Item A.10)

	Clad Temp (°F)	Ref.	Notes
<b>LICENSING BASIS</b>			
<b>Analysis-Of-Record PCT</b>	2180	1,2	(a)
<b>MARGIN ALLOCATIONS (Delta PCT)</b>			
<b>A. PRIOR PERMANENT ECCS MODEL ASSESSMENTS</b>			
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2 . 1-D Transition Boiling Heat Transfer Error (1997 Report)	59	5	
3 . Vessel Channel DX Error (1997 Report)	-14	5	
4 . Input Consistency (1997 Report)	-66	5	
5 . No Items for 1996, 1998 & 2004 Reports	0	4,6,23	
6 . Accumulator Line/Pressurizer Surge Line Data / Plant Specific Accumulator Level & Line Volume / Plant Specific Restart Error: Reanalysis (1999 Report)	113	7	(b)
7 . Modeling Updates and Unheated Conductor Input Corrections (plant specific) (2000 Report)	-147	8,9	(c)
8 . Accumulator Pressure +/- 30 psi Range (Plant Specific) (2001 Report)	8	10,11	(d)
9 . LHSI Error Evaluation (Plant Specific) (2002 Report)	30	12,13	(g)
10 . Sensitivity Study for FQ=2.5, LHSI Correction, etc. (as listed in note (f)) (Plant Specific) (2003 Report)	-47	15,17,18	(f,h)
11 . Broken Loop Nozzle Loss Coefficient (Plant Specific) (2003 Report)	-19	17,18,20, 24	(h)
<b>B. PLANNED PLANT CHANGE EVALUATIONS</b>			
1 . Sensitivity Study for Steam Generator Tube Plugging Increase to 25%	52	8	
2 . Accumulator Water Volume +/- 25 ft3 Range	12	10	
3 . Accumulator Pressure Extended to +/- 55 psi Range	21	10	
4 . Cycle 22 SATP Core Average Burnup	17	19	

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5 . HAUP LOCA Evaluation	3	21
6 . SATP Core Average Burnup Extension for Cycle 23 Redesign	7	22
<b>C. 2005 PERMANENT ECCS MODEL ASSESSMENTS</b>		
1 . SECY Cold Leg Nozzle Expansion	13	24
<b>D. TEMPORARY ECCS MODEL ISSUES*</b>		
1 . None	0	

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**Westinghouse LOCA Peak Clad Temperature Summary for SECY UPI Large Break**

**Plant Name:** Prairie Island Unit 2  
**Utility Name:** Nuclear Management Company, LLC  
**Revision Date:** 7 /29/05

**E. OTHER**

1 . Removal of Reference 12 LHSI Error Evaluation -30 15 (g)

**LICENSING BASIS PCT + MARGIN ALLOCATIONS PCT = 2017**

\* It is recommended that these temporary PCT allocations which address current LOCA model issues not be considered with respect to 10 CFR 50.46 reporting requirements.

**References:**

- 1 . 95NS-G-0021. "Updated UPI LBLOCA." March 24, 1995.
- 2 . WCAP-13919. Addendum 1, "Prairie Island Units 1 and 2 WCOBRA/TRAC Best Estimate UPI Large Break LOCA Analysis Engineering Report Addendum 1: Updated Results," December 1996.
- 3 . NSP-96-202. "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting," February 20, 1996.
- 4 . NSP-97-201. "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting," April 17, 1997.
- 5 . NSP-98-012. "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 1997." February 27, 1998.
- 6 . NSP-99-010. "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 1998." April 29, 1999.
- 7 . NSP-00-005. "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 1999." February 2000.
- 8 . NSP-00-057. "Northern States Power Company Prairie Island Units 1 and 2 LOCA Evaluation of 25% SGTP with Other Modeling Updates." December 11, 2000.
- 9 . NSP-01-006. "Northern States Power Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2000." March 6, 2001.
- 10 . NSP-02-9. "Nuclear Management Company Prairie Island Units 1 and 2 LBLOCA Accumulator Pressure and Volume Ranges Evaluation," February 15, 2002.
- 11 . NSP-02-5. "Nuclear Management Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2001." March 2002.
- 12 . NSP-02-59/LTR-ESI-02-194. "Final Evaluation of Large Break LOCA Error." December 2002.
- 13 . NSP-03-19. "Nuclear Management Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2002," March 2003.
- 14 . MP92-TAH-0394 / ET-NSL-OPL-1-92-518. "NSPC Prairie Island Units 1 and 2. SG Tube Flow Area Reduction under LOCA / SSE - Final Report". October 21, 1992.

Westinghouse Proprietary Class 2

NSP-05-191

- 15 . NSP-04-10 "Safety Analysis Transition Program Transmittal of Engineering Report," February 20, 2004.
- 16 . NSP-93-513, Rev 1/ET-NSL-OPL-I-93-313, Rev. 1, Letter from T. A. Hawley (W) to K. E. Higar (NSP). "Final Transmittal of Assumptions to be used for the Large and Small Break LOCA Analyses, Rev. 1". July 7, 1993. Confirmed by : Letter from K. E. Higar (NSP) to Mr. T. Hawley (W), "Acceptance of NSPD930513, Rev. 1", July 30, 1993.
- 17 . NSP-04-38. "Nuclear Management Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2003." March 2004.
- 18 . WCAP-16206-P, "SATP Engineering Report for Prairie Island," February 2004.
- 19 . NF-NMC-04-50. "Nuclear Management Company Prairie Island Unit 2 Cycle 22 Final RSE." April 2004.
- 20 . NSP-04-65, "Nuclear Management Company Prairie Island Units 1 & 2 Safety Analysis Transition Program Response to 10 CFR 50.46 Inquiry," April 21, 2004.
- 21 . NSP-05-155, "Nuclear Management Company, Reactor Vessel Head Replacement Project, Prairie Island Units 1 & 2," May 18, 2005.

**Westinghouse LOCA Peak Clad Temperature Summary for SECY UPI Large Break**

**Plant Name:** Prairie Island Unit 2  
**Utility Name:** Nuclear Management Company, LLC  
**Revision Date:** 7/29/05

- 22 . NF-NMC-05-38 Rev. 1, "Prairie Island Unit 2 Cycle 23 Final RSE." May 13, 2005
- 23 . NSP-05-65. "Nuclear Management Company Prairie Island Units 1 and 2 10 CFR 50.46 Annual Notification and Reporting for 2004," April 2005.
- 24 . Misc. SECY Errors Transmittal, August 2005.

**Notes:**

- (a) P-bar-HA increased from 1.57 to 1.59
- (b) Reanalysis for all listed issues
- (c) Reanalysis for both issues
- (d) Related JCO in existence (NSP-01-030). NMC cognizant of uncertainty application and PCT sheet categorization.
- (e) It is assumed that NMC is applying the 0.36% SGTP allowance factor branch of the SG LOCA / SSE issue (Reference 14). Thus the 25% SGTP Study (Item B.1) supports a net SGTP limit of 24.64%.
- (f) Sensitivity Study for: FQ=2.50, PAD 4.0 Implementation. Restoration of LHSI to Reference 16 values. SG/Loop  $\Delta P$  Re-tuning, Core Power Restoration.
- (g) The note (f) sensitivity study allows for the removal of the Reference 12 engineering assessment.
- (h) Items A.10 and A.11 presented as aggregate -66 °F entry prior to Reference 20 decomposition.