

December 14, 2007

Mr. Michael D. Wadley
Site Vice President
Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC
1717 Wakonade Drive East
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2 -
ISSUANCE OF AMENDMENTS RE: REVISE TECHNICAL SPECIFICATIONS IN
SUPPORT OF CONTAINMENT SUMP RESOLUTION (TAC NOS. MD3811 AND
MD3812)

Dear Mr. Wadley:

The Commission has issued the enclosed Amendment No. 182 to Facility Operating License No. DPR-42 and Amendment No. 172 to Facility Operating License No. DPR-60 for the Prairie Island Nuclear Generating Plant (PINGP), Units 1 and 2, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 14, 2006, as supplemented by letter dated November 13, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML063480462 and ML073170700 respectively).

The amendments revise the sump debris interceptor nomenclature in PINGP Unit 1 and Unit 2 Technical Specifications (TS) 3.5.2 to more clearly reflect the configuration of the new Emergency Core Cooling System sump strainers that were installed to address Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors." The amendments also revise the required Refueling Water Storage Tank (RWST) water level in TS 3.5.4 to reflect the administratively-controlled water inventory in the RWST.

A copy of our related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,



Mahesh L. Chawla, Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-282 and 50-306

Enclosures:

1. Amendment No. 182 to DPR-42
2. Amendment No. 172 to DPR-60
3. Safety Evaluation

December 14, 2007

Mr. Michael D. Wadley
Site Vice President
Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC
1717 Wakonade Drive East
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2 -
ISSUANCE OF AMENDMENTS RE: REVISE TECHNICAL SPECIFICATIONS IN
SUPPORT OF CONTAINMENT SUMP RESOLUTION (TAC NOS. MD3811 AND
MD3812)

Dear Mr. Wadley:

The Commission has issued the enclosed Amendment No. 182 to Facility Operating License No. DPR-42 and Amendment No. 172 to Facility Operating License No. DPR-60 for the Prairie Island Nuclear Generating Plant (PINGP), Units 1 and 2, respectively. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 14, 2006, as supplemented by letter dated November 13, 2007 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML063480462 and ML073170700 respectively).

The amendments revise the sump debris interceptor nomenclature in PINGP Unit 1 and Unit 2 Technical Specifications (TS) 3.5.2 to more clearly reflect the configuration of the new Emergency Core Cooling System sump strainers that were installed to address Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors." The amendments also revise the required Refueling Water Storage Tank (RWST) water level in TS 3.5.4 to reflect the administratively-controlled water inventory in the RWST.

A copy of our related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/
Mahesh L. Chawla, Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-282 and 50-306

Enclosures:

1. Amendment No. to DPR-42
2. Amendment No. to DPR-60
3. Safety Evaluation

cc w/encs: See next page

DISTRIBUTION

PUBLIC

RidsNrrLATHarris

G. Hill, OIS

RidsNrrDorDpr

LPL3-1 r/f

RidsOGCRp

RidsRgn3MailCenter

RidsNrrDorLp3-1

RidsAcrsAcnwMailCenter

RidsNrrPMMChawla

RidsNrrDirsltsb

Accession Nos.: PKG: ML073340517, AMD: ML073340526, TS Pages: ML073520400

OFFICE	NRR/LPL3-1/PM	NRR/LPL3-1/LA	SSIB/BC	EMCB/BC	ITSB/BC	OGC	NRR/LPL3-1/(A)BC
NAME	MChawla <i>MChawla</i>	THarris <i>THarris</i>	MScott*	KManoly*	<i>TKobetz</i>	PMoulding	CMunson <i>CMunson</i>
DATE	12/14/07	12/14/07	11/28/07	11/28/07	12/14/07	12/14/07	12/14/07

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET NO. 50-282

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 182
License No. DPR-42

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Nuclear Management Company, LLC (the licensee), dated December 14, 2006, as supplemented by letter dated November 13, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-42 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 182, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA Jack Cushing for/

Cliff Munson, Acting Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility Operating License
and Technical Specifications

Date of Issuance: December 14, 2007

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET NO. 50-306

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 172
License No. DPR-60

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Nuclear Management Company, LLC (the licensee), dated December 14, 2006, as supplemented by letter dated November 13, 2007, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-60 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 172, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA Jack Cushing for/

Cliff Munson, Branch Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility Operating License
and Technical Specifications

Date of Issuance: December 14, 2007

ATTACHMENT TO LICENSE AMENDMENT NOS. 182 AND 172

FACILITY OPERATING LICENSE NOS. DPR-42 AND DPR-60

DOCKET NOS. 50-282 AND 50-306

Replace the following pages of the Facility Operating License No. DPR-42 and DPR-60 with the attached revised pages. The changed areas are identified by a marginal line.

REMOVE

DPR-42, License Page 3
DPR-60, License Page 3

INSERT

DPR-42, License Page 3
DPR-60, License Page 3

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

3.5.2-3
3.5.4-2

INSERT

3.5.2-3
3.5.4-2

- (4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, NMC to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument and equipment calibration or associated with radioactive apparatus or components;
- (5) Pursuant to the Act and 10 CFR Parts 30 and 70, NMC to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility;
- (6) Pursuant to the Act and 10 CFR Parts 30 and 70, NMC to transfer byproduct materials from other job sites owned by Northern States Power Company for the purpose of volume reduction and decontamination.

C. This amended license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

NMC is authorized to operate the facility at steady state reactor core power levels not in excess of 1650 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 182, are hereby incorporated in the license. NMC shall operate the facility in accordance with the Technical Specifications.

(3) Physical Protection

NMC shall fully implement and maintain in effect all provisions of the Commission-approved physical security, guard training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contains Safeguards Information protected under 10 CFR 73.21, is entitled: "Prairie Island Nuclear Generating Plant Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Storage Installation Security Program," Revision 1, submitted by letters dated October 18, 2006, and January 10, 2007.

Unit 1

Amendment No.182

- (5) Pursuant to the Act and 10 CFR Parts 30 and 70, NMC to possess but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility;
- (6) Pursuant to the Act and 10 CFR Parts 30 and 70, NMC to transfer byproduct materials from other job sites owned by Northern States Power Company for the purposes of volume reduction and decontamination.

C. This amended license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

NMC is authorized to operate the facility at steady state reactor core power levels not in excess of 1650 megawatts thermal.

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 172, are hereby incorporated in the license. NMC shall operate the facility in accordance with the Technical Specifications.

(3) Physical Protection

NMC shall fully implement and maintain in effect all provisions of the Commission-approved physical security, guard training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contains Safeguards Information protected under 10 CFR 73.21, is entitled: "Prairie Island Nuclear Generating Plant Security Plan, Training and Qualification Plan, Safeguards Contingency Plan, and Independent Spent Fuel Storage Installation Security Program," Revision 1, submitted by letters dated October 18, 2006, and January 10, 2007.

Unit 2

Amendment No. 172

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY										
SR 3.5.2.4	Verify each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head.	In accordance with the Inservice Testing Program										
SR 3.5.2.5	Verify each ECCS automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, actuates to the correct position on an actual or simulated actuation signal.	24 months										
SR 3.5.2.6	Verify each ECCS pump starts automatically on an actual or simulated actuation signal.	24 months										
SR 3.5.2.7	Verify each ECCS throttle valve listed below is in the correct position. <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: left;"><u>Unit 1 Valve Number</u></th> <th style="text-align: left;"><u>Unit 2 Valve Number</u></th> </tr> </thead> <tbody> <tr> <td>SI-15-6</td> <td>2SI-15-6</td> </tr> <tr> <td>SI-15-7</td> <td>2SI-15-7</td> </tr> <tr> <td>SI-15-8</td> <td>2SI-15-8</td> </tr> <tr> <td>SI-15-9</td> <td>2SI-15-9</td> </tr> </tbody> </table>	<u>Unit 1 Valve Number</u>	<u>Unit 2 Valve Number</u>	SI-15-6	2SI-15-6	SI-15-7	2SI-15-7	SI-15-8	2SI-15-8	SI-15-9	2SI-15-9	24 months
<u>Unit 1 Valve Number</u>	<u>Unit 2 Valve Number</u>											
SI-15-6	2SI-15-6											
SI-15-7	2SI-15-7											
SI-15-8	2SI-15-8											
SI-15-9	2SI-15-9											
SR 3.5.2.8	Verify, by visual inspection, each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet strainers show no evidence of structural distress or abnormal corrosion.	24 months										

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.5.4.1 Verify RWST borated water volume is $\geq 265,000$ gallons (90%).	7 days
SR 3.5.4.2 Verify RWST boron concentration is ≥ 2600 ppm and ≤ 3500 ppm.	7 days

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 182 TO FACILITY OPERATING LICENSE NO. DPR-42
AND AMENDMENT NO. 172 TO FACILITY OPERATION LICENSE NO. DPR-60
NUCLEAR MANAGEMENT COMPANY, LLC
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2
DOCKET NOS. 50-282 AND 50-306

1.0 INTRODUCTION

By application dated December 14, 2006, as supplemented by letter dated November 13, 2007, the Nuclear Management Company, LLC (NMC, the licensee), requested changes to the Technical Specifications (TSs) for the Prairie Island Nuclear Generating Plant (PINGP), Units 1 and 2. The supplement dated November 13, 2007, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazard's consideration determination as published in the *Federal Register* on February 27, 2007 (72 FR 8804).

The proposed changes would revise the sump debris interceptor nomenclature in PINGP Unit 1 and Unit 2 TS 3.5.2 to more clearly reflect the configuration of the new Emergency Core Cooling System (ECCS) sump strainers that were installed to address Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors." The amendments also revise the required Refueling Water Storage Tank (RWST) water level in TS 3.5.4 to reflect the administratively-controlled water inventory in the RWST.

In a letter dated September 13, 2004, the Nuclear Regulatory Commission (NRC) issued GL 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design-Basis Accidents at Pressurized-Water Reactors." The GL identified a potential susceptibility of recirculation flow paths and sump screens to debris blockage. The GL requested that addressees perform an evaluation of the ECCS and containment spray system (CSS) recirculation functions in light of the information provided in the letter and, if appropriate, take additional actions to ensure system functionality.

To meet the applicable regulatory requirements discussed in GL 2004-02, PINGP Units 1 and Unit 2 replaced the existing ECCS sump suction inlet debris interceptors, referred to in TS Surveillance Requirement (SR) 3.5.2.8 as "trash racks and screens," with strainer modules. Also, to provide for additional ECCS pump net positive suction head (NPSH) during sump recirculation, the licensee proposed to increase the post Loss-of-Coolant Accident (LOCA) water volume in containment by increasing the minimum required RWST water volume from 200,000 gallons to 265,000 gallons. To reflect the revised RWST water volume and the new strainer configuration in the TSs, the licensee submitted a request to amend the PINGP Unit 1 and Unit 2 (TS) to revise the RWST minimum water level specified in SR 3.5.4.1 from 68

percent to 90 percent instrument level indication and to revise the ECCS sump debris interceptor nomenclature in SR 3.5.2.8 from "trash racks and screens" to "strainers."

2.0 REGULATORY EVALUATION

Section 182a of the Atomic Energy Act requires applicants for nuclear power plant operating licenses to include TSs as part of the license. The licensee provides TSs in order to maintain the operational capability of structures, systems and components that are required to protect the health and safety of the public. The Commission's regulatory requirements related to the content of the TS are contained in 10 CFR 50.36, "Technical specifications." Pursuant to 10 CFR 50.90, licensees may request changes to their TSs.

2.1 RWST Water Level

The licensee has proposed a change to SR 3.5.4.1 to increase the required RWST water level from 200,000 gallons (corresponding to an instrument level indication of approximately 68 percent) to 265,000 gallons (corresponding to an instrument level indication of approximately 90 percent). The increase is to provide additional margin in the containment sump analyses. (Plant administrative controls currently require maintaining the RWST at or above 90 percent level).

The regulations in Title 10, of the *Code of Federal Regulations Part 50 Section 46* (10 CFR 50.46), "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors" and 10 CFR Part 50, Appendix K, "ECCS Evaluation Models" specify the requirements for the design and analysis of ECCS. These regulations are in place to ensure adequate core cooling following a LOCA such that specified acceptance criteria are satisfied. The specified acceptance criteria include peak clad temperature, total cladding oxidation, total hydrogen generation, maintaining a coolable core geometry and ensuring adequate long-term core cooling. The applicable acceptance criterion for the proposed license amendment is the long-term core cooling criterion.

This criterion requires that the core temperature be maintained at an acceptably low value and that decay heat be removed for the extended period of time required by the long-lived radioactivity remaining in the core. The required borated water inventory for the RWST ensures that during a LOCA (1) sufficient negative reactivity is injected into the core to counteract any positive increase in reactivity caused by reactor coolant system cool-down, and (2) that there is sufficient water inventory in containment to provide the required ECCS pump suction pressure and ECCS-sump screen submergence. This safety evaluation reviews the licensee's proposed TS change to ensure that this requirement is met.

2.2 Sump Strainer

The licensee has proposed a change to SR 3.5.2.8, which covers the periodic inspection of the containment sump screen assembly relied upon by the ECCS for long-term functionality. The licensee's November 13, 2007, supplement to the December 14, 2006, request, describes the current licensing basis for the ECCS containment sump screen/debris interceptor, as stated in the final safety analysis report, to be as follows:

"The recirculation sump is completely covered by standard floor grating having ¾ inch by 3-11/16 inch openings. The size of opening was based on precluding entrance of any

large pieces into the sump. Gravity - separation of any entering debris is facilitated by the use of elevated side-wall outlets from the recirculation sump to the residual heat removal pumps. Minimization of screen-clogging debris is accomplished by the use of metallic reflective insulation, specially qualified fiberglass blankets, and protective coatings conforming to ANSI Standard N101.5 (October, 1970) inside the primary containment."

GL 2004-02 requested that pressurized-water reactor (PWR) licensees evaluate the performance of their containment recirculation sumps, and implement any modifications necessary to ensure compliance with applicable regulatory requirements on a mechanistic basis in light of the technical issues associated with Generic Safety Issue 191 (GSI-191), "Assessment of Debris Accumulation on PWR Sump Performance." The GL requested that PWR licensees complete actions necessary for compliance with applicable regulatory requirements, using the updated information associated with GSI-191, by December 31, 2007. Prior to this date, GL 2004-02 concluded that licensees' compliance with their current licensing bases was sufficient to support continued plant operation.

This safety evaluation reviews the licensee's proposed TS change to ensure that consistency with the current licensing basis is maintained. Assurance that PWR licensees' proposed sump modifications are adequate in light of the technical issues associated with GSI-191 will be provided separately through the staff's review of GL 2004-02 supplemental responses, through selected sample audit reviews of PWR licensees' sump performance calculations, and through reviews of standardized industry guidance and vendor practices.

3.0 TECHNICAL EVALUATION

3.1 Proposed Change to TS 3.5.4

Currently, SR 3.5.4.1 requires 200,000 gallons in the RWST, which corresponds to an instrumentation level of 68 percent. However, the licensee stated that the RWST volume is administratively maintained at 265,000 gallons, which corresponds to 90 percent instrumentation level. Further, there is no TS limit on maximum RWST level.

The licensee proposes to increase the required level to 265,000 gallons corresponding to approximately 90 percent instrumentation level indication.

3.1.1 RWST Design Function

The RWST supplies borated water to the Chemical and Volume Control System during abnormal operating conditions, to the refueling pool during refueling, and to the ECCS and Containment Spray System during a LOCA. During the initial phase of a LOCA, the RWST supplies the ECCS and CSS. Therefore, the contents of the RWST are pumped into containment where, along with the inventory spilled from the reactor-vessel, it forms a pool in the basement of the containment building, flooding the ECCS sump. Upon receipt of a low RWST water level signal, the Residual Heat Removal (RHR) system pump suction is realigned to draw water from the ECCS sump. In this recirculation mode, the containment can be cooled indefinitely.

Since the current volume in the RWST is administratively maintained at 265,000 gallons, the proposed TS change will not result in any increase in the post-LOCA water level inside

containment. Further, the licensee stated that there is no TS limit on maximum RWST borated water volume. For analyses where maximum borated water volume is a conservative input, the RWST is assumed to be full. Therefore, these analyses are not affected by the proposed change.

3.1.2 Licensee Justification for Proposed TS Change

The licensee stated that the TS requirement for RWST level, as stated in the Bases B 3.5.4, is specific to ensure that:

- The RWST contains sufficient borated water to support the ECCS during the injection phase.
- Sufficient water volume exists in the containment sump to support continued operation of the ECCS at the time of transfer to the recirculation mode of cooling.
- The reactor remains sub-critical following a LOCA.

Sufficient water in the RWST ensures adequate NPSH for the RHR pumps when the transfer to the recirculation mode occurs. Increasing the TS required RWST level increases the time available before entering the recirculation mode and increases the containment pool level in the basement, providing the following benefits toward resolution of PWR containment sump blockage issues.

- Allows more time for potential debris to settle before ECCS enters the recirculation mode.
- Increases the probability for potential debris to settle by lowering the water velocity to the sump.
- Increases the NPSH available to the RHR pumps.

The licensee stated that the current TSs do not impose a maximum RWST borated water volume. Therefore, for analyses where maximum borated water volume is a conservative input, the RWST is assumed to be full. These analyses are not affected by the proposed TS change.

3.1.3 NRC Staff Evaluation

In determining the adequacy of the licensee's proposed change to SR 3.5.4.1, the staff's evaluation considered whether the increase in the minimum required RWST water volume had a negative affect on ECCS sump performance and if plant systems, structures and components were adversely affected. As described above, the TS change has no immediate effect on the actual RWST inventory because the inventory is administratively maintained at the proposed TS level. Based on the licensee's justifications, as stated in section 3.1.2 above, including the statement that analyses where maximum borated water volume is a conservative input assume a full RWST and that these analyses are not affected by the proposed TS change, the staff concludes that the change in the required RWST volume from 200,000 gallons to 265,000 gallons does not adversely affect any plant systems, structures, or components. The staff further concludes that the proposed change enhances plant safety for the reasons stated in Section 3.1.2 .

3.2 Proposed Change to TS 3.5.2

Currently, the PINGP SR 3.5.2.8 states: "Verify, by visual inspection, that each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion."

The licensee proposes to revise TS SR 3.5.2.8 to state: "Verify, by visual inspection, that each ECCS train containment sump suction inlet is not restricted by debris and the suction inlet strainers show no evidence of structural distress or abnormal corrosion."

3.2.1 PINGP Containment Sump Screen/Trash Rack Design Changes

The PINGP ECCS sump (sump B) is a pit located in the containment building basement at elevation 697'-6. The sump pit is surrounded by a concrete curb. Two 14-inch diameter RHR suction lines, with 20-inch diameter inlets, draw water from the sump during the recirculation phase of containment cooling. The suction lines are elevated above the sump floor to minimize the ingestion of debris that may enter the sump pit. The sump pit was originally covered with standard floor grating that functioned as a trash-rack and screen. Debris that passed through the grating was assumed to be separated by gravity and settle to the sump floor. Due to the ¾ inch by 3-11/16 inch hole-size, head loss through the screen was not a concern.

The licensee stated that the new PINGP Unit 1 and Unit 2 Containment Sump B strainers are a much improved design over the original grating and preclude most of the smaller debris from passing through the strainer perforations due to their small opening size. (The new strainers were sized to preclude the entry of large material into the downstream ECCS.) The newly installed Sure-Flow Q Strainer® assemblies were engineered and manufactured by Performance Contracting, Inc. (PCI). Two trains of strainer modules are connected to the common Sump B pit cover plate, which is designed to form a suction chamber in the existing sump pit. Since debris is prevented from entering the sump pit by the cover and strainer design, the sump pit elevated side wall (curb) design feature is met without crediting the side wall.

In addition, as noted above, SR 3.5.2.8 will continue to require the licensee to perform the containment sump strainer inspections.

3.2.2 Licensee Justification for Proposed Change to SR 3.5.2.8

In a letter dated November 13, 2007, the licensee stated that the containment sump strainers installed to resolve issues associated with GL-2004-02 meet the licensing basis criterion of precluding large debris from passing through the screen to the pumps. Also, to minimize strainer-clogging debris, PINGP continues to use metallic reflective insulation and protective coatings conforming to American National Standards Institute (ANSI) Standard N101.5 (October, 1970) inside the primary containment. Further, with the original Sump B screens, the RHR pumps (the only pumps taking suction from Sump B) were assured an adequate available NPSH; the NPSH available to the RHR pumps was also evaluated for the replacement strainers.

The licensee stated that the original design-basis analysis for the NPSH available to the RHR pumps was updated to include revisions to the emergency operating procedures when transferring to recirculation. The licensee stated that the analysis demonstrated there is positive margin in the NPSH available to the RHR pumps. This margin was used as an input in the

Sump B strainer head loss evaluation. The licensee concluded that these analyses demonstrate that the suction strainers are adequately sized so that the RHR pumps will perform satisfactorily during long term post-LOCA recirculation with the design bases debris loading. The licensee stated that this evaluation demonstrates that the new strainer meets the updated safety analysis report licensing basis for the original sump screens.

The licensee stated that the proposed change to TS SR 3.5.2.8 provides a more appropriate description of the sump configuration after the installation of the larger strainer assembly.

3.2.3 NRC Staff Evaluation

3.2.3.1 Evaluation of Sump Strainer Functionality

In determining the adequacy of the licensee's proposed TS change regarding the surveillance of the sump strainer, the staff's evaluation considered whether the replacement strainer assembly is capable of fulfilling the design functions of the original screens under the current licensing basis. The containment sump's design-basis function is to provide the ability to circulate containment pool water to cool the reactor core and to remove decay heat from the containment building following a LOCA, via the ECCS pumps. Based on a review of the licensee's summary of its NPSH analysis, the staff concludes that the licensee demonstrates adequate sump functionality based on providing sufficient NPSH to the RHR pumps and preventing large debris from entering the ECCS, thereby satisfying the current sump licensing basis. Further, the proposed TS SR change is a change only in terminology and does not affect the surveillances performed under the SR. Therefore, the functionality of the sump strainers will continue to be assured under TS SR 3.5.2.8.

Based upon the information described above, the staff considers the replacement strainer configuration as meeting the intent of the current sump performance licensing basis because the functionality of the ECCS sump (Sump B) is maintained. Therefore, the staff considers the replacement strainers to be functionally equivalent to (or better than) the existing debris interceptors under the current licensing basis for satisfying the requirements of 10 CFR 50.46(b) (5) for long-term reactor core cooling.

Consistent with the intent of GL 2004-02, current licensing basis compliance is sufficient until December 31, 2007. The NRC staff has requested that licensees complete modifications to their licensing bases for containment recirculation sump performance to ensure consistency with the mechanistic methodology associated with GSI-191 no later than December 31, 2007. Assurance that the licensee's replacement strainer design is adequate for satisfying the intent of GL 2004-02 will be provided by the staff's regulatory activities regarding GL 2004-02 and GSI-191, including reviews of licensees' supplemental responses to GL 2004-02, sample audits of licensees' sump performance calculations, and reviews of generic industry guidance and practices.

3.2.3.2 Evaluation of Dynamic Effects

3.2.3.2.1 Pipe Whip, Jet Impingement, and Missile Impact

The staff's review of dynamic effects focused on whether the planned replacement strainer evaluation has adequately considered the potential dynamic effects associated with high-energy

line break, pipe whip, jet impingement, and missile impact. In October 2006, the NRC conducted a GSI-191 audit of PINGP operated by NMC.

In response to NRC GL 2004-02, PINGP removed the existing trash racks and installed a new Sure-Flow® strainer designed by PCI sump to bring the plant into full compliance with 10 CFR 50.46. No screens were used in the previous PINGP design, while the Sure-Flow® strainer is an advanced configuration intended to be very resistant to potential blockage. The strainer arrangement for each of the two PINGP Units consists of two strainer trains of Sure Flow® Strainer modules connecting to a common sump pit cover plate designed to form a suction chamber in the existing sump pit. The effective surface area of the new strainer for each train is 413.65 ft², for a total of 827.3 ft². The strainer configuration is designed to limit the head loss to 10 feet during post-LOCA design conditions.

There are 10 modules in each strainer train, a core tube, and mounting tracks. The modules are essentially identical with the only difference being the hole size in the core tube. Each module is independently supported. The modules are connected with thin gauge stainless steel bands that are used to prevent debris from entering the system between the two modules. This connection permits relative motion in the axial direction as the core tube can slide relative to the stainless steel bands. Each module is made of stainless steel perforated plate with hole-diameter of 0.085 inch. The perforated sheets are riveted together along the outside edge and shop welded to a core tube along the inner edges. The modules are located approximately 3 inches above the containment floor. As such, the 6-inch-high curb surrounding the sump no longer provides a barrier to prevent sediment from entering the strainers. The sump is thus totally enclosed by the sump pit cover.

No high-energy line break locations have been identified that could cause direct jet impingement. The licensee determined, and the staff agrees, that there were no direct paths from potential break locations to affect the strainers; hence pipe whip and jet impingement are not applicable. The licensee also determined, and the staff agrees, that there are no missiles impacting the sump strainer assemblies.

For the reasons stated above, based on its review of the information provided by the licensee, the staff finds that the new sump strainer is adequately protected from pipe whip, jet impingement, and missiles.

3.2.3.2.2 Structural Design of the Replacement Strainer

The licensee prepared structural analyses and related calculations to establish the structural integrity of the strainer assemblies of PINGP Units 1 and 2 as documented in supplement dated November 13, 2007, in response to request for additional information.

(1) The calculation PCI-5343-S01 presents the structural analysis of the PCI suction strainer modules as well as the supporting structures associated with the new strainers. The evaluations were performed using a combination of manual calculations and finite element analyses using GTSTRUDL and ANSYS finite element computer programs.

In the analysis, the licensee explained that the following loads were utilized:

Thermal loads: are considered as zero because the strainers are free standing and are free to expand without restraint.

- Pressure loads:
 - (a) The normal operating pressure load (pressure drop across a clean strainer) was considered;
 - (b) The differential pressure load during accident conditions when the strainers are covered with debris was considered.
- Dynamic loads:
 - (a) The inertial effects of the added hydrodynamic mass due to the submergence of the piping were considered;
 - (b) Hydrodynamic drag loads due to sloshing are negligible as the maximum sloshing load is less than 5 lbs per module,
- Seismic loads: A response spectrum of the design basis earthquake defined in DIT No. 04RH04-12 was used in the seismic analysis.
- Missiles, pipe whip and pipe rupture loads: These loads were not considered because the licensee determined that there were no direct paths from potential break locations to affect the strainers.

The analysis results were presented in terms of maximum stress interaction ratios (i.e., calculated stress divided by allowable stress). The results showed that all ratios were smaller than 1.0 by using standards of USAS (ANSI) B31.1 Power Piping 1967 & 1998 Editions, AISC-1963 Edition, American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section III, Division 1, Subsections NB, NC, and Appendices, 1998 Edition, through 1999 Addenda, and ANSI/AISC N690-1994. The licensee's evaluation verified that the strainer can withstand the hydrodynamic loads and inertial effects of water in the containment basement, at full debris loading, without loss of structural integrity.

The analysis and calculation results showed that the proposed suction strainer modules and their supporting structures meet Class I Seismic Criteria for their intended safety function.

Based on its independent review of the licensee's analysis, the staff finds the strainer structural loading in the analysis meets the guidelines of RG 1.82.

(2) The calculation PCI-5343-S02 evaluates the sump cover, piping, and the supporting structures associated with the new piping. The evaluation included the sump cover plate and all piping from and including the one attached to the El. 698' floor slab to the strainer module structures.

The evaluations were performed by using the AutoPIPE Program. The piping is subjected to two operating conditions: a "dry" condition with no recirculation water inside or external water present; and "wet" condition with recirculation water. The piping "dry" state was not analyzed because this condition was considered to be less severe than the "wet" condition. The loads considered in the analysis are weight, pressure, seismic, and thermal loads.

- The weight includes the weight of the pipe and flange weights. The enclosed water inside the piping is not accounted for because of buoyancy in the "wet" condition. The maximum differential pressure load acting on the piping is considered.
- Thermal expansion loads were determined by thermal expansion analysis based on maximum water temperature of 253° F.
- Seismic Inertia Loads:

The seismic sloshing loads in PWR containment are not accounted for because they were considered insignificant by comparison with other seismic loads. The inertial effects of the added hydrodynamic mass due to the submergence of the piping were considered. The calculated hydrodynamic mass in the lateral direction is 5.26 times the mass of the water enclosed in the pipe and the vertical mass is about 2.80 times that mass. The AutoPIPE input conservatively adjusted the specific gravity of the contents to 5.26.

The allowable stresses are based on ANSI B31.1 Power Piping 1967 Edition, ASME Section III, Appendix L, and AISC - 1963 Edition. The calculation results showed that under all loading conditions considered, the interaction ratios are less than 0.2.

Based on its review of the information provided by the licensee, the staff concludes that the load combinations used in the analysis, which considered normal operating, operating basis earthquake and design basis earthquake loading conditions, are in accordance with the guidelines described in NUREG-0800, Section 3.8.4. Accordingly, the staff finds the evaluation of sump cover and piping for the containment sump strainers to be acceptable.

3.2.3.2.3 Modifications

In response to the staff's request for information to identify any pipe reroutes, and pipe support changes or any other modifications required to accommodate the new strainer assemblies, the licensee provided the following summary information:

The installation of the new strainers did not involve rerouting or resupporting any process piping. The modifications of other items included modification of cable tray supports, capping abandoned piping, and relocation and re-supporting of level transmitter standpipes. Two cable tray supports for Unit 1 and one cable tray support for Unit 2 were modified to accommodate the new strainer installation. The modified cable tray support stresses due to applied cable tray loads were calculated and compared to the allowable stresses per American Institute of Steel Construction (AISC) Allowable Stress Design Code, 6th and 9th Editions and the procedure for Kwik Bolt 3 concrete anchor installation.

All the support component stresses were less than the Code allowable stress limits and found to be acceptable. All structural elements of the modified cable tray supports used to support the existing cable trays, as well as the existing supporting building structure, were acceptable. An abandoned liquid waste disposal pipe was capped and welded closed inside the sump in each unit. These lines were previously capped on the other end. Two 6-inch standpipes for the sump level transmitters in both units were relocated to corners of the sump cover plate. In their new location, the standpipes are supported at the sump curb and guided approximately 2.5 feet above the new sump cover plate using new seismic restraints.

The instrument stand support stresses due to applied instrument loads were calculated and compared to the allowable stresses per AISC Code and the 2006 Hilti Product Technical Guide Supplement (for Hilti Kwik Bolt 3). All support component stresses are less than the code allowable stresses and found to be acceptable. All structural elements of the instrument supports and the existing supporting building structure are acceptable. The level transmitter standpipe supports are adequate to withstand the

combined effect of dead weight and seismic loads and the level transmitters remain seismically qualified.

3.2.3.2.4 Summary of Dynamic Effects Evaluation

Based on its review of the input from the licensee regarding the pipe whip, jet impingement, missile impact, loads and load combinations, the design codes utilized in the structural design, and the modifications described above, the staff concludes that the licensee has adequately evaluated the replacement sump strainer assemblies.

3.2.4 Summary of TS 3.5.2 Evaluation

As described above, the proposed revision would clarify terminology associated with the replacement strainers and sump configuration. The licensee will continue to be required to visually inspect the containment sump suction inlet with a 24-month frequency to verify that it is not restricted by debris and that its debris filters show no evidence of structural distress or abnormal corrosion. The staff determined that, under the current licensing basis, the planned replacement strainers are functionally equivalent to (or better than) the existing screens for satisfying 10 CFR 50.46(b)(5) for long-term reactor core cooling. In addition, the staff noted that generic review activities associated with GL 2004-02 will provide assurance that PWR licensees'

replacement strainer designs are adequate to satisfy applicable regulatory requirements in accordance with the mechanistic criteria associated with GSI-191. Based upon these findings, and on the staff's finding that the licensee has adequately evaluated the assemblies with respect to structural dynamic effects, the staff concludes that the proposed revision to SR 3.5.2.8 is acceptable.

4.0 SUMMARY

The staff has reviewed the licensee's proposed revision to SR 3.5.4.1 of the PINGP TS and also has evaluated the implications associated with increasing the minimum RWST water inventory imposed by the revision. As described above, the TS change has no immediate effect on the actual RWST inventory because the inventory is administratively maintained at the proposed TS level. Further, the TS proposed volume of 265,000 gallons is beneficial with respect to ECCS sump performance and does not adversely affect analyses where the assumption of maximum RWST volume is conservative. Therefore, the staff concludes that the proposed revision to SR 3.5.4.1 is acceptable, and meets the requirements of 10 CFR 50.36.

The staff has also reviewed the licensee's proposed revision to SR 3.5.2.8 of the PINGP TS. As described above, the proposed revision would clarify terminology associated with the replacement strainers and sump configuration. The licensee will continue to be required to visually inspect the containment sump suction inlet with a 24-month frequency to verify that it is not restricted by debris and that its debris filters show no evidence of structural distress or abnormal corrosion. The staff determined that, under the current licensing basis, the planned replacement strainers are functionally equivalent to (or better than) the existing screens for satisfying 10 CFR 50.46(b)(5) for long-term reactor core cooling. The staff's analysis also confirmed that the licensee has adequately evaluated the replacement strainer assemblies with respect to consideration of structural dynamic effects. In addition, the staff noted that generic review activities associated with GL 2004-02 will provide assurance that PWR licensees' replacement strainer designs are adequate to satisfy applicable regulatory requirements in

accordance with the mechanistic criteria associated with GSI-191. Therefore, the staff concludes that the proposed revision to SR 3.5.2.8 is acceptable, and meets the requirements of 10 CFR 50.36.

5.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Minnesota State official was notified of the proposed issuance of the amendment. The State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

The amendment changes the requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or change the surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (72 FR 8804). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

7.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: E. Geiger
B. Chakrapani

Date: December 14, 2007

Prairie Island Nuclear Generating Plant,
Units 1 and 2

cc:

Jonathan Rogoff, Esquire
Vice President, Counsel & Secretary
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Manager, Regulatory Affairs
Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC
1717 Wakonade Drive East
Welch, MN 55089

Manager - Environmental Protection Division
Minnesota Attorney General's Office
445 Minnesota St., Suite 900
St. Paul, MN 55101-2127

U.S. Nuclear Regulatory Commission
Resident Inspector's Office
1719 Wakonade Drive East
Welch, MN 55089-9642

Administrator
Goodhue County Courthouse
Box 408
Red Wing, MN 55066-0408

Commissioner
Minnesota Department of Commerce
85 7th Place East, Suite 500
St. Paul, MN 55101-2198

Tribal Council
Prairie Island Indian Community
ATTN: Environmental Department
5636 Sturgeon Lake Road
Welch, MN 55089

Nuclear Asset Manager
Xcel Energy, Inc.
414 Nicollet Mall, R.S. 8
Minneapolis, MN 55401

Michael B. Sellman
President and Chief Executive Officer
Nuclear Management Company, LLC
700 First Street
Hudson, MI 54016

Dennis L. Koehl
Chief Nuclear Officer
Nuclear Management Company, LLC
700 First Street
Hudson, WI 54016

Joel P. Sorenson
Director, Site Operations
Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC
1717 Wakonade Drive East
Welch, MN 55089

July 2006