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

Response to Requests for Additional Information Regarding Regulatory Guide 1.97  
Instrumentation Associated with Adoption of the Alternative Source Term (AST)  
Methodology (TAC Nos. ME2609 and ME2610)

In a letter to the U.S. Nuclear Regulatory Commission (NRC) dated October 27, 2009 (Agencywide Documents and Management System (ADAMS) Accession No. ML093160583), the Northern States Power Company, a Minnesota corporation doing business as Xcel Energy (hereafter "NSPM"), requested an amendment to the Technical Specifications (TS) for Prairie Island Nuclear Generating Plant (PINGP). The proposed amendment requested adoption of the Alternative Source Term (AST) methodology, in addition to TS changes supported by AST design basis accident radiological consequence analyses.

The NRC Staff sent Requests for Additional Information (RAI) in a letter dated May 12, 2011 (ADAMS Accession No. ML103540433) regarding the steam generator tube rupture (SGTR) event radiological consequence analysis. In a letter dated June 22, 2011 (ADAMS Accession No. ML111740145), NSPM provided a response to these RAIs. On July 20, 2011 (ADAMS Accession No. ML112081967), the NRC Staff sent a consolidated request for clarification of the June 22, 2011 RAI response. In a letter dated August 9, 2011 (ADAMS Accession No. ML112220098), NSPM provided a response to the request for clarification of the June 22, 2011 RAI response. On September 1, 2011, the NRC Staff sent a draft request for further clarification of the August 9, 2011 RAI response via electronic mail, regarding the classification of instruments as they relate to the criteria of Regulatory Guide 1.97, Revision 2. In a conference call held on November 14, 2011, the NRC modified the request for clarification and provided a final request for additional information on November 22, 2011 (ADAMS Accession No. ML113250575).

The enclosure to this letter provides the response to the November 22, 2011 request for additional information. NSPM submits this supplement in accordance with the provisions of 10 CFR 50.90.

The supplemental information provided in this letter does not impact the conclusions of the Determination of No Significant Hazards Consideration and Environmental Assessment presented in the October 27, 2009 submittal.

In accordance with 10 CFR 50.91, NSPM is notifying the State of Minnesota of this license amendment request supplement by transmitting a copy of this letter to the designated State Official.

If there are any questions or if additional information is needed, please contact Mr. John Fields at 763-271-6707.

Summary of Commitments

This letter makes the following new commitment:

NSPM will revise the Prairie Island Nuclear Generating Plant design and licensing bases to indicate that the Steam Generator Water Level – Narrow Range instruments are required to meet Regulatory Guide 1.97, Revision 2 requirements. This commitment will be completed prior to implementation of the Alternative Source Term license amendment.

See the enclosure for details concerning this new commitment. No revisions to existing commitments are being made.

I declare under penalty of perjury that the foregoing is true and correct.

DEC 08 2011

Executed on



Mark A. Schimmel  
Site Vice President, Prairie Island Nuclear Generating Plant  
Northern States Power Company - Minnesota

Enclosure

cc: Administrator, Region III, USNRC  
NRR Project Manager, PINGP, USNRC  
Resident Inspector, PINGP, USNRC  
State of Minnesota

## ENCLOSURE

In a letter to the U.S. Nuclear Regulatory Commission (NRC) dated October 27, 2009 (Agencywide Documents and Management System (ADAMS) Accession No. ML093160583), the Northern States Power Company, a Minnesota corporation doing business as Xcel Energy (hereafter "NSPM"), requested an amendment to the Technical Specifications (TS) for Prairie Island Nuclear Generating Plant (PINGP). The proposed amendment requested adoption of the Alternative Source Term (AST) methodology, in addition to TS changes supported by AST design basis accident radiological consequence analyses.

In a letter dated November 22, 2011, the NRC provided the following request for additional information (RAI) related to the PINGP AST proposed license amendment. For clarity, the NRC RAI information is provided below in italics font and the NSPM response is provided in plain font.

### Background

*By letters dated June 22, 2011, and August 9, 2011, in response to Nuclear Regulatory Commission (NRC) staff requests for additional information, the licensee provided a tabulation of instrumentation required to cope with a Steam Generator Tube Rupture (SGTR) event. The NRC staff has reviewed these responses and requests further clarification regarding the appropriate qualification levels for this instrumentation.*

### Request for Additional Information

- (1) Identify which instrumentation on the table discussed above are the "Principal" Instrumentation and Controls (I&C) needed for the identification and mitigation of the SGTR event, and which equipment are considered "available" as a back-up or secondary instrument function, if needed. Principal and backup instrumentation are as described in Westinghouse topical report WCAP-10698-P-A (proprietary).*
- (2) For each of the items identified as Principal I&C equipment used, state whether this equipment is safety-related or not, and describe the qualification levels to which this equipment meets PINGP's current licensing basis for identifying safety related equipment. Provide justification for the use of any equipment on this list that is not qualified to meet safety related standards appropriate to your licensing basis. Include a description of that equipment which is not fully-qualified to meet requirements for safety-related instrumentation per your licensing basis, but has been upgraded to have augmented quality, and describe how this augmented quality has been achieved.*

### NSPM Response

By letters dated June 22, 2011, and August 9, 2011, NSPM provided a tabulation of instrumentation required to cope with a Steam Generator Tube Rupture. Table 1

(provided below) tabulates the principal instrumentation from the June 22 and August 9 letters. For each principal instrument, Table 1 provides the following information:

- Function of each instrument used in mitigation of a Steam Generator Tube Rupture.
- Safety classification of the process loop associated with the instrument.
- Safety classification of the indication associated with the instrument.
- For those principal instruments or indications that are not safety related, the backup indication is identified.
- Additional details regarding power supply and other pertinent considerations.

As used in Tables 1 and 2, augmented quality (AQ) describes a subset of non-safety related items for which one or more of the governing Quality Assurance Topical Report (QATR) requirements apply. This includes items for which specific licensing commitments or additional controls over quality are deemed necessary by NSPM management, but are not explicitly defined in the QATR. Quality requirements for the instrumentation are established to satisfy the applicable requirements in the licensing basis as established through commitments to meet Regulatory Guide (RG) 1.97, Revision 2, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," as described in the PINGP Updated Safety Analysis Report (USAR) Section 7.10. In lieu of classifying RG 1.97 instrumentation as safety related, the RG 1.97 instruments are classified as Augmented Quality; although the requirements are very similar. Qualifications regarding quality assurance, environmental qualification and seismic qualification are described in USAR Section 7.10.2, and are consistent with Regulatory Positions 1.3.1 (Category 1) and 1.3.2 (Category 2) in RG 1.97, Revision 2.

As demonstrated by Table 1, all of the instruments utilized for SGTR mitigation in the PINGP-specific Emergency Operating Procedures (EOPs) are currently classified as RG 1.97, Revision 2, instrumentation in the PINGP USAR, except for Steam Generator (SG) Water Level – Narrow Range (NR). Based on a review of the specific mitigation function that the instrument provides, the SG-NR level instrumentation should be reclassified in accordance with RG 1.97, Revision 2. This mis-classification is being tracked as a corrective action in the PINGP Corrective Action Program. Based on the failure to properly classify the SG Water Level Narrow Range Indication as RG 1.97 instrumentation, the corrective action also includes an extent of condition review to ensure that other instrumentation used in EOPs are correctly classified consistent with the PINGP licensing basis.

The function and classification of each of the instruments included in Table 1 is provided below.

#### Core Exit Thermocouples

The core exit thermocouples (CETs) are used by operators to terminate the Reactor Coolant System (RCS) cooldown during SGTR recovery. Additionally, the CETs are used by the operators to demonstrate that SI flow termination criteria are met. As shown in Table 1, the CETs are currently classified design and qualification Category 1; therefore, they meet the qualification requirements prescribed by RG 1.97, Regulatory Position 1.3.1. Additionally, the CETs are listed in TS Table 3.3.3-1 as event monitoring instrumentation.

#### RCS Subcooling Monitor

RCS Subcooling monitor indication provides information for operator action termination of RCS depressurization. Specifically, RCS subcooling is used for terminating RCS depressurization and SI termination. Pressurizer level, RCS pressure and SG pressure can also be used to terminate RCS depressurization. The RCS Subcooling monitors are currently classified design and qualification Category 2; therefore, they meet the qualification requirements prescribed by RG 1.97, Regulatory Position 1.3.2.

#### Steam Generator Water Level – Narrow Range

The SG Water Level – NR (SG-NR) instruments provide the primary means of identification of a ruptured steam generator by indication of an unexpected increase in any SG-NR channel level. Immediately following identification of the ruptured SG, operators manually isolate the ruptured SG. As such, SG-NR level provides the primary information required to permit the control room operators to take the specified manually controlled actions.

The SG-NR instrumentation is not identified in the PINGP USAR as compliant with RG 1.97. This deficiency has been entered into the PINGP Corrective Action Program. The Corrective Action Program condition evaluation determined that the SG-NR instrumentation should be classified as a RG 1.97 Type A instrument. However, further evaluation is necessary to fully demonstrate and document the correct RG 1.97 type classification of the instruments and ensure the RG 1.97 design and qualification criteria requirements are implemented.

Based on this, NSPM is making the following commitment regarding the SG-NR instrumentation:

NSPM will revise the Prairie Island Nuclear Generating Plant design and licensing bases to indicate that the Steam Generator Water Level – Narrow Range instruments are required to meet Regulatory Guide 1.97, Revision 2 requirements. This commitment will be completed prior to implementation of the Alternative Source Term license amendment.

This commitment will ensure:

- Implementation of the correct design and qualification criteria for these instruments in accordance with RG 1.97, Revision 2,
- The PINGP USAR is updated to document the correct RG 1.97 classification based on the results of the evaluation of the PINGP EOPs in relation to the technical basis for the SG-NR instrumentation, and
- The Technical Specifications will be revised in accordance with 10 CFR 50.36(c)(ii), to change the licensing bases associated with the SG-NR instruments, if required.

#### Pressurizer Water Level

Pressurizer water level indication is used by operators to provide Reactor Coolant System (RCS) depressurization and Safety Injection (SI) flow termination criteria for a SGTR event. The pressurizer water level indicators are currently classified design and qualification Category 1; therefore, they meet the qualification requirements prescribed by RG 1.97, Regulatory Position 1.3.1. Additionally, the pressurizer water level indicators are listed in TS Table 3.3.3-1 as event monitoring instrumentation.

#### Reactor Coolant System Pressure

RCS pressure indication is used by operators to provide RCS depressurization and SI flow termination criteria for a SGTR event. The RCS pressure indicators are currently classified design and qualification Category 1; therefore, they meet the qualification requirements prescribed by RG 1.97, Regulatory Position 1.3.1. Additionally, the RCS pressure indicators are listed in TS Table 3.3.3-1 as event monitoring instrumentation.

#### Steam Generator Pressure

SG pressure indication provides information for operator action for determining the target cooldown temperature and for termination of RCS depressurization. Specifically, RCS depressurization is terminated by the operator when the RCS pressure is lower than the ruptured SG pressure. As allowed by the EOP, depressurization of the ruptured SG can also be terminated based on either pressurizer water level or RCS subcooling. The SG pressure indicators are currently classified design and qualification Category 2; therefore, they meet the qualification requirements prescribed by RG 1.97, Regulatory Position 1.3.2 as described in the PINGP USAR Section 7.10.2. As described above, pressurizer water level indication is classified as a RG 1.97 Category 1 variable and, accordingly meets the qualification requirements prescribed by RG 1.97, Regulatory Position 1.3.1.

**Table 1  
 Principal and Backup Instrumentation  
 Utilized for Steam Generator Tube Rupture Mitigation**

| <b>Principal Instrument Name</b> | <b>Function</b>  | <b>Safety Classification (Process Loop)</b> | <b>Safety Classification (Indicator)</b> | <b>Backup Instrumentation</b> | <b>Safety Classification of Backup Instrumentation</b> | <b>Remarks</b>   |
|----------------------------------|--|---|--|-------------------------------|--|--|
| Core Exit Thermocouples (CETs)   | Monitor RCS temperature for securing cooldown.                               | SR  | SR<br>(RG 1.97, Category 1)              |                               |  | Indication is safety related. Several CETs are provided. The CET power supply is safety related and will be available during a LOOP.                                       |
| RCS Subcooling Monitor           | Monitor RCS Subcooling for securing RCS depressurization and SI termination. | SR  | AQ<br>(RG 1.97 Category 2)               | Redundant monitors            | Same as Principal Instrument                           | Subcooling is calculated from an average of Core Exit Thermocouples and RCS Pressure. CETs are SR. The RCS Pressure input provides Class 1E inputs to the display systems. |

| Principal Instrument Name                     | Function              | Safety Classification (Process Loop) | Safety Classification (Indicator)   | Backup Instrumentation  | Safety Classification of Backup Instrumentation | Remarks  |
|---|-----------------------|--------------------------------------|---|---|---|--|
| SG Water Level Indication – Narrow Range (NR) | Identify Ruptured SG. | SR                                   | NSR<br><br>(Note that, currently, this indication is not classified per RG 1.97 in the PINGP licensing basis. The indication will be classified as described in the response to RAI Questions 1 and 2.) | Three separate indication channels for each steam generator are displayed in the control room.<br><br>Emergency Response Computer System (ERCS) provides backup indications for SG narrow range water level. ERCS is supplied by an Uninterruptible Power Supply (UPS) and redundant power sources to network switches and remote multiplexing units. | Same as Principal Instrument due to redundancy. | The instrument loops from the sensing line through the transmitter are safety related. The indication is on the non-safety related side of the loop. The indicator power supply is safety related and will be available during a LOOP. |



| Principal Instrument Name          | Function  | Safety Classification (Process Loop) | Safety Classification (Indicator) | Backup Instrumentation  | Safety Classification of Backup Instrumentation | Remarks  |
|------------------------------------|---|--------------------------------------|-----------------------------------|---|---|--|
| Pressurizer Water Level Indication | Provides indication to the operators that supports securing RCS depressurization and termination of SI. | SR                                   | AQ (RG 1.97, Category 1)          | <p>Three separate indication channels per Unit are displayed in the control room.</p> <p>ERCS provides backup indications for pressurizer water level. ERCS is supplied by a UPS and redundant power sources to network switches and remote multiplexing units.</p> | Same as Principal Instrument due to redundancy. | The instrument loops from the sensing line through the transmitter are safety related. The indicators are augmented quality. The indicator power supply is safety related and will be available during a LOOP. |

| Principal Instrument Name | Function  | Safety Classification (Process Loop) | Safety Classification (Indicator) | Backup Instrumentation  | Safety Classification of Backup Instrumentation | Remarks   |
|---------------------------|---|--------------------------------------|-----------------------------------|---|---|---|
| RCS Pressure Indication   | Provides indication to the operators that supports securing RCS depressurization and termination of SI. | AQ                                   | AQ (RG 1.97, Category 1)          | Two separate indication channels per Unit are available in the control room.<br><br>ERCS provides backup indications for RCS pressure. ERCS is supplied by a UPS and redundant power sources to network switches and remote multiplexing units. | Same as Principal Instrument due to redundancy. | The RCS pressure indicators and transmitters are augmented quality. The indicator power supply is safety related and will be available during a LOOP. |

| Principal Instrument Name | Function   | Safety Classification (Process Loop) | Safety Classification (Indicator) | Backup Instrumentation  | Safety Classification of Backup Instrumentation  | Remarks   |
|---------------------------|--|--------------------------------------|-----------------------------------|---|--|---|
| SG Pressure Indication    | <p>Provides indication to the operators that supports determination of target cooldown temperature.</p> <p>SG pressure indication is also used during RCS depressurization to secure the depressurization.</p> | SR                                   | AQ<br>(RG 1.97, Category 2)       | <p>Three separate indication channels per steam generator are available in the control room.</p> <p>ERCS provides backup indications for SG pressure. ERCS is supplied by a UPS and redundant power sources to network switches and remote multiplexing units.</p> <p>During RCS depressurization, pressurizer water level and RCS subcooling monitor can also be used as an indication to stop RCS depressurization.</p> | <p>Same as Principal Instrument due to redundancy.</p> <p>As shown above, Pressurizer water level instrumentation is RG 1.97, Category 1. RCS subcooling monitor is RG 1.97, Category 2.</p> | <p>The instrument loops from the sensing line through the transmitter are safety related. The indicators are non-safety related. The indication meets all requirements for a RG 1.97, Category 2, instrument. The indicator power supply is safety related and will be available during a LOOP.</p> |

Table 2 identifies instrumentation used as secondary instrumentation in the SGTR event. The function and classification of each of the instruments included in Table 2 is provided below.

Radiation Monitors (Condenser Air Ejector, Steam Generator Blowdown, Main Steam Line)

The radiation monitors can be used to provide an early indication of a SGTR. In addition, the main steam line radiation monitors can provide indication to help determine which SG is ruptured. In the event that operators do not transition to the SGTR Emergency Operations Procedure (EOP) based on the radiation monitor signal, the operators would transition based on the SG-NR Water Level indication. The SG-NR water level indication is the credited indication in the Margin to Overfill (MTO) analysis for identifying that a SGTR exists and for identifying the ruptured SG. Thus, the radiation monitors provide an early identification, but are not credited in the analysis. The condenser air ejector and main steam line radiation monitors are classified as RG 1.97 Category 2 instruments and meet the design and qualification criteria in RG 1.97, Revision 2, Regulatory Position 1.3.2 as described in the PINGP USAR section 7.10.2. No changes to the design and licensing bases are required for this instrumentation.

**Table 2  
 Secondary Instrumentation  
 Utilized for Steam Generator Tube Rupture Mitigation**

| <b>Secondary Instrument Name</b>                  | <b>Function</b>   | <b>Safety Classification (Process Loop)</b> | <b>Safety Classification (Indicator)</b> | <b>Backup Instrumentation</b>  | <b>Remarks</b>   |
|---|---|---|--|--|--|
| Condenser Air Ejector Radiation Monitor           | Although the radiation monitors are not credited in the SGTR analyses, they provide an early indication of a SGTR event. In addition, the main steam line radiation monitors provide indication of which steam generator is ruptured. | AQ  | AQ<br>(RG 1.97, Category 2)              | In the event that the operators do not transition to the SGTR EOP based on the radiation monitor signal, the operators would transition to the SGTR EOP based on SG-NR level indication increasing in an uncontrolled manner.<br><br>ERCS provides backup indications for these radiation monitors. ERCS is supplied by a UPS and redundant power sources to network switches and remote multiplexing units. | The power supply to the condenser air ejector and steam generator blowdown radiation monitor is safety related and will be available during a LOOP. The power supply to the main steam line radiation monitor is non-safety related, but is backed up by a non-safety related diesel generator and expected to be available during a LOOP. |
| Steam Generator Blowdown Liquid Radiation Monitor |   | NSR   | NSR                                      |  |  |
| Main Steam Line Radiation Monitor                 |   | AQ  | AQ<br>(RG 1.97, Category 2)              |  |  |

**Request for Additional Information**

- (3) *The PINGP Updated Safety Analysis Report, Tables 7.10-1 and 7.10-2 enumerate the Regulatory Guide 1.97, Rev. 2 variables applicable to Units 1 and 2, respectively. These tables have been previously reviewed and approved by the NRC in various safety evaluations. Verify that appropriate accident monitoring instrumentation supporting Principal SGTR indication functions is included on these tables.*

**NSPM Response**

The PINGP Updated Safety Analysis Report (USAR), Tables 7.10-1 and 7.10-2 enumerate the Regulatory Guide 1.97, Rev. 2 variables applicable to Units 1 and 2, respectively. The information in these tables has previously been reviewed and approved by the NRC in various safety evaluations. The Principal instrumentation supporting SGTR events described above is included in USAR tables 7.10-1 and 7.10-2 with the following exception:

- Steam Generator Water Level – Narrow Range is not included in USAR Tables 7.10-1 and 7.10-2. This instrument will be added to USAR Tables 7.10-1 and 7.10-2. This mis-classification is being tracked as a corrective action in the PINGP Corrective Action Program. Based on the failure to properly classify the SG Water Level Narrow Range Indication as RG 1.97 instrumentation, the corrective action also includes an extent of condition review to ensure that other instrumentation used in EOPs are correctly classified consistent with the PINGP licensing basis.

For further details concerning the commitment which addresses this condition, see the discussion concerning the SG-NR instruments provided in the response to RAIs 1 and 2.