



SEP 15 2010

L-PI-10-082  
10 CFR 50 Appendix H

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

Supplement to Request for Revision to Reactor Vessel Material Surveillance Capsule  
Withdrawal Schedule for Prairie Island Nuclear Generating Plant (PINGP) (TAC Nos.  
ME3708 and ME3709)

- References:
1. Letter from Northern States Power Company, a Minnesota corporation (NSPM), doing business as Xcel Energy, to NRC, "Request for Revision to Reactor Vessel Material Surveillance Capsule Withdrawal Schedule for Prairie Island Nuclear Generating Plant (PINGP)", dated March 30, 2010, ADAMS Accession Number ML100900089.
  2. Letter from NRC to NSPM, "Request for Additional Information Related to Request for Revision to Reactor Vessel Material Surveillance Capsule Withdrawal Schedule (TAC Nos. ME3708 and ME3709)", dated August 11, 2010, ADAMS Accession Number ML102170369.

In Reference 1, NSPM requested NRC approval for a revision to the PINGP, Units 1 and 2, reactor vessel material surveillance capsule withdrawal schedule. In Reference 2, the NRC Staff requested additional information to support review of Reference 1. The Enclosure 1 to this letter provides the responses to the NRC Staff requests for additional information.

If there are any questions or if additional information is needed, please contact Mr. Dale Vincent, P.E., at 651-388-1121.

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Summary of Commitments

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



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Enclosures (1)

cc: Administrator, Region III, USNRC  
Project Manager, PINGP, USNRC  
Resident Inspector, PINGP, USNRC

## Enclosure 1

### Supplement to Request for Revision to Reactor Vessel Material Surveillance Capsule Withdrawal Schedule for Prairie Island Nuclear Generating Plant (PINGP)

The Nuclear Regulatory Commission (NRC) Staff has requested the following additional information to support review and approval of the Northern States Power Company, a Minnesota corporation (NSPM), request for revision to reactor vessel material surveillance capsule withdrawal schedule for PINGP. NRC questions are shown in bold.

- 1. Confirm that the 54 EFPY [effective full power years] peak RV [reactor vessel] neutron fluence is correct for each unit.**

NSPM response:

NSPM confirms that the 54 EFPY peak reactor vessel neutron fluence is  $5.162 \times 10^{19}$  n/cm<sup>2</sup> (E > 1.0 MeV) and  $5.196 \times 10^{19}$  n/cm<sup>2</sup> (E > 1.0 MeV), for PINGP Unit 1 and Unit 2 respectively. The peak fluence, located at the 0° azimuth core intermediate shell, was determined in a calculation performed for the Measurement Uncertainty Recapture (MUR) power uprate license amendment request (Reference 1). The calculation determined that the 54 EFPY fluence would be reached by 26.5 EFPY for Unit 1 capsule N and 28.5 EFPY for Unit 2 capsule S.

For Unit 1, the value is based upon a reactor vessel fluence/EFPY of  $8.164 \times 10^{17}$  n/cm<sup>2</sup> and a fluence at 32 EFPY of  $3.366 \times 10^{19}$  n/cm<sup>2</sup>. For Unit 2, the value is based upon a reactor vessel fluence/EFPY of  $8.527 \times 10^{17}$  n/cm<sup>2</sup> and a fluence at 32 EFPY of  $3.320 \times 10^{19}$  n/cm<sup>2</sup>.

- 2. If the 54 EFPY peak RV vessel neutron fluences are correct, discuss the reasons that the projected neutron fluencies are less than that projected by the staff, such as improved neutron fluence modeling, or actual physical core modifications such as implementation of a low-leakage core.**

NSPM response:

There are several reasons for the differences between the projected fluence used in the MUR power uprate calculation and the projected NRC Staff values in the request for additional information (RAI) letter (Reference 2), which were based on prior analyses for Unit 1 capsule S and Unit 2 capsule P. The primary differences are discussed below:

- A change in neutron fluence calculation methodology: The neutron fluence calculation to support the MUR power uprate used methodologies that are

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consistent with the methodology described in WCAP-14040-A, Revision 4, "Methodology Used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves." Although WCAP-14040-A, Revision 4, is not included in the current licensing basis for PINGP, it is used for the fluence calculations which support the capsule removal schedule as discussed in Reference 2 and the following paragraph.

The current Pressure and Temperature Limits Report (PTLR) uses WCAP-14040-NP-A, Revision 2 methodology. An evaluation was performed to assure that the current plant operating PTLR heatup and cooldown curves bound curves prepared in accordance with WCAP-14040-A, Revision 4 methodology. This evaluation concluded that, for all materials, the fluence values used in the development of the current pressure/temperature (P-T) limit curves are larger than the MUR fluence values. Therefore, the use of WCAP-14040-A, Revision 4 methodology for MUR is justified.

- b) A change in modeled core average and downcomer temperatures: In prior analyses, the core average and downcomer temperatures were conservatively modeled as 570.6°F and 535.5°F, respectively. In the MUR analysis, from May 2003 until the start of the power uprate, the core average temperature and downcomer temperatures were modeled as 563.2°F and 527.9°F, respectively. These temperatures, although still conservative, more adequately represent current conditions. After heavy bundle and MUR implementation, these temperatures are modeled as 563.3°F and 527.4°F. Note that the change in temperature due to MUR is small.
  - c) A change in the cycles used in the projections: For the previous capsule analysis, cycle information for Unit 1 was only available up through cycle 17, and for Unit 2 through cycle 16. At the time of the MUR calculations, information was available for the first 24 cycles of Unit 1 and first 23 cycles of Unit 2. The projected peripheral assembly average relative power for cycles beyond the first 24 cycles for Unit 1 (beyond 23 for Unit 2) is anticipated to be slightly lower than the values during cycles 13 through 17 for Unit 1 (through 16 for Unit 2) which were used in the RAI.
  - d) A change in core power: The MUR analysis increased the assumed core average power by approximately 2.5%.
- 3. Discuss whether the factors addressed in response to Question 2 also apply to the projected neutron fluence for the remaining PINGP, Unit 1 and 2 surveillance capsules.**

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### NSPM response:

Differences 2 a) and b) apply to projected neutron fluence for the remaining surveillance capsules since they represent an improvement in the modeling of the neutron fluence.

The current fuel management philosophy includes use of low-leakage cores. Difference 2 c) will remain applicable as long as low-leakage cores continue to be used. If this design philosophy were to change, projections of neutron fluence would need to be updated. Heavy bundle (422+V) fuel, which is currently being phased into the PINGP cores since NRC approval in June 2009, has a negligible impact on the axial and radial power distributions. With continued use of low-leakage cores, changes to the axial and radial power distributions should remain within the typical variations seen in cycle to cycle loading pattern changes.

Difference 2 d) will become effective when MUR is implemented, which is projected for October 2010. The fluence calculations for MUR were based upon an MUR implementation date of September 2008. Thus, the fluence value at the time of surveillance capsule removal will be less than projected. This change is minor compared to the amount of fluence which has accumulated on the surveillance capsules since the time when 54 EFPY was anticipated to be reached.

#### **4. Provide the average neutron flux per cycle used for the projection of the 54 EFPY peak RV neutron fluence for each unit.**

### NSPM response:

For Unit 1, the reactor vessel fluence/EFPY is  $8.164 \times 10^{17}$  n/cm<sup>2</sup>. For Unit 2, the reactor vessel fluence/EFPY is  $8.527 \times 10^{17}$  n/cm<sup>2</sup>. Cycle lengths are approximately 18 to 22 months.

### References:

1. Letter from NSPM to the NRC, "License Amendment Request for Measurement Uncertainty Recapture – Power Uprate," dated December 28, 2009, ADAMS Accession Number ML093650045.
2. Letter from NSPM to the NRC, "Supplement to License Amendment Request for Measurement Uncertainty Recapture-Power Update, Withdrawal of Proposed Change to Analysis Methodology for Pressure Temperature Limits Report (TAC Nos. ME3015 and ME3016)", dated April 23, 2010, ADAMS Accession Number ML101130449.