



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

August 11, 2010

Mr. Mark A. Schimmel
Site Vice President
Prairie Island Nuclear Generating Plant
Northern States Power Company - Minnesota
1717 Wakonade Drive East
Welch, MN 55089-9642

**SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2 -
REQUEST FOR ADDITIONAL INFORMATION RELATED TO REQUEST FOR
REVISION TO REACTOR VESSEL MATERIAL SURVEILLANCE CAPSULE
WITHDRAWAL SCHEDULE (TAC NOS. ME3708 AND ME3709)**

Dear Mr. Schimmel:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 30, 2010 (Agencywide Documents Management System ML100900089), Northern States Power Company, a Minnesota corporation (the licensee), doing business as Xcel Energy, submitted a request for approval for a revision to the reactor vessel material surveillance capsule withdrawal schedule for Prairie Island Nuclear Generating Plant, Units 1 and 2.

The NRC staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is addressed in the enclosure to this letter. During a discussion with Mr. Dale Vincent of your staff on August 2, 2010, it was agreed that you would provide a response to this request within 45 days of the date of this letter.


The NRC staff considers that timely responses to requests for additional information help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources.

M. Schimmel

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If circumstances result in the need to revise the requested response date, please contact me at (301) 415-4037.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas J. Wengert". The signature is fluid and cursive, with the first name "Thomas" and last name "Wengert" clearly distinguishable.

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-282 and 50-306

Enclosure:
Request for Additional Information

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REQUEST FOR ADDITIONAL INFORMATION

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-282 AND 50-306

In reviewing the Northern States Power Company, a Minnesota corporation (NSPM, the licensee), doing business as Xcel Energy, submittal dated March 30, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100900089), which requested approval for a revision to the reactor vessel (RV) material surveillance capsule withdrawal schedule for Prairie Island Nuclear Generating Plant (PINGP), Units 1 and 2 (Reference 1), the U.S. Nuclear Regulatory Commission (NRC) staff has determined that the following information is needed to complete its review:

Background

The applicable regulatory requirements for a RV materials surveillance program are found in 10 CFR Part 50 Appendix H, III.B.1, which requires that the design of the surveillance program and the withdrawal schedule meet the requirements of the edition of American Society for Testing and Materials (ASTM) E 185, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels," that is current on the issue date of the American Society of Mechanical Engineers Code to which the RV was purchased. Later editions of ASTM E 185 may be used, but including only those editions through 1982. The regulation at 10 CFR Part 50, Appendix H further states that, for each capsule withdrawal, the test procedures and reporting requirements must meet the requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Additionally, 10 CFR Part 50, Appendix H, III.B.3 requires that a proposed withdrawal schedule must be submitted with a technical justification as specified in Section 50.4. The proposed schedule must be approved prior to implementation. ASTM E 185-82 recommends that for a reactor with five surveillance capsules installed, the last capsule should be withdrawn at a neutron fluence greater than once, but less than twice the peak end-of-license vessel neutron fluence.

In the licensee's technical justification for a change in the surveillance capsule withdrawal schedule, the maximum RV neutron fluences at 54 effective full power years (EFPY) for PINGP, Unit 1 and PINGP, Unit 2, are stated to be $5.162 \times 10^{19} \text{ n/cm}^2$ ($E > 1.0 \text{ MeV}$) and $5.196 \times 10^{19} \text{ n/cm}^2$ ($E > 1.0 \text{ MeV}$), respectively. The NRC staff performed a confirmatory projection of the 54 EFPY RV neutron fluence based on the neutron flux rates and 35 EFPY neutron fluences given in References 2 and 3. Reference 2 indicated that the 24 and 35 EFPY neutron fluence projections for PINGP, Unit 1 were based on the average exposure rates for Cycles 13 through 17. Reference 3 indicated that the 24 and 35 EFPY neutron fluence projections were based on the average exposure rates for Cycles 13 through 16. These exposure rates for the RV clad/base metal interface were given in Table 6-2 of Reference 2 and Table 6-2 of Reference 3. When the staff used these average neutron fluxes to project the 54 EFPY neutron fluence, higher values were obtained than the 54 EFPY neutron fluence values provided by the applicant. The staff used the 0° core midplane best estimate neutron fluences at 35 EFPY from Table 6-15 of Reference 2 and Table 6-15 of Reference 3, as the baseline to project the neutron fluence to 54 EFPY (the 0° azimuthal location of the RV is the peak neutron fluence location). The staff obtained 54 EFPY neutron fluences of $5.64 \times 10^{19} \text{ n/cm}^2$ ($E > 1.0 \text{ MeV}$) for PINGP, Unit 1 and $6.01 \times 10^{19} \text{ n/cm}^2$ ($E > 1.0 \text{ MeV}$) for PINGP, Unit 2. The licensee's proposed capsule

Enclosure

withdrawal schedule calls for PINGP, Unit 1 Capsule N to be withdrawn at an estimated neutron fluence of 5.893×10^{19} n/cm² (E > 1.0 MeV) and PINGP, Unit 2 Capsule S to be withdrawn at a projected neutron fluence of 5.739×10^{19} n/cm² (E > 1.0 MeV).

The staff notes that in Section 4.2.1 of the PINGP Application for Renewed Operating Licenses (Reference 4), the applicant stated that the neutron fluence projections (for license renewal) were based on historical operational data through Cycle 24 for PINGP, Unit 1 and Cycle 23 for PINGP, Unit 2. However, to arrive at the applicant's projected neutron fluence values for 54 EFPY, the neutron flux would have to be significantly less than the average neutron flux during cycles 13 through 17 for PINGP, Unit 1 and PINGP, Unit 2. The license renewal application did not discuss neutron flux reduction measures to be taken prior to or during the period of extended operation, or specifically address improvements in neutron fluence modeling techniques that may have resulted in a lower projection of the RV neutron fluences at 54 EFPY.

The NRC staff is therefore concerned that the proposed surveillance capsule withdrawal schedule will result in the capsules intended to be representative of the end of license extension neutron fluence being withdrawn early such that the capsule neutron fluence does not meet the ASTM E 185-82 criterion. While the PINGP, Unit 1 capsule would still meet the criterion using the staff's projection of RV neutron fluence, the PINGP, Unit 2 capsule would have a ratio less than one of the capsule-to-peak RV neutron fluence using the staff's projection.

Requested Information

1. Confirm that the 54 EFPY peak RV neutron fluence is correct for each unit.
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.
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.
4. Provide the average neutron flux per cycle used for the projection of the 54 EFPY peak RV neutron fluence for each unit.

References

1. Letter from Mark A. Schimmel to NRC dated March 30, 2010; Subject: Prairie Island Nuclear Generating Plant Units 1 and 2, Dockets 50-282 and 50-306, License Nos. DPR-42 and DPR-60, "Request for Revision to Reactor Vessel Material Surveillance Capsule Withdrawal Schedule for Prairie Island Nuclear Generating Plant (PINGP) (ADAMS Accession No. ML100900089).
2. WCAP-14779, Revision 2, Analysis of Capsule S from the Northern States Power Company Prairie Island Unit 1 Reactor Vessel Radiation Surveillance Program, February 1998, Westinghouse Electric Company (ADAMS Accession No. 9803160251).

3. WCAP-14613, Revision 2, Analysis of Capsule P from the Northern States Power Company Prairie Island Unit 2 Reactor Vessel Radiation Surveillance Program, February 1998, Westinghouse Electric Company (ADAMS Accession No. 9803160251).
4. Application for Renewed Operating Licenses, Prairie Island Nuclear Generating Plant Units 1 and 2, April 11, 2008 (ADAMS Accession No. ML081130673).

M. Schimmel

- 2 -

If circumstances result in the need to revise the requested response date, please contact me at (301) 415-4037.

Sincerely,

/RA/

Thomas J. Wengert, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-282 and 50-306

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