



Prairie Island Nuclear Generating Plant
1717 Wakonade Drive East
Welch, MN 55089

SEP 21 2011

L-PI-11-044
10 CFR 50.55a

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

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

Inservice Testing Program Fourth Ten-Year Interval Relief Request 12 - Proposed
Alternative for Pump Vibration Testing

Pursuant to the provisions of 10 CFR 50.55a(a)(3)(i), the Northern States Power Company, a Minnesota Corporation (NSPM), doing business as Xcel Energy, hereby requests NRC authorization of the attached proposed alternative for the Fourth Ten-Year Interval of the Inservice Testing (IST) Program for the Prairie Island Nuclear Generating Plant (PINGP) Units 1 and 2.

NSPM requests approval of alternative American Society of Mechanical Engineers (ASME) OM code ranges for vibrations with measured reference values at or below 0.05 in/sec for the PINGP Control Room Chiller pumps. This proposed alternative is being submitted for NRC review and authorization in accordance with 10 CFR 50.55a(a)(3)(i).

The pumps identified in the proposed alternative are tested in accordance with the PINGP IST Program. Each of these pumps has at least one vibration reference value that is currently less than 0.05 in/sec. Because a small reference value produces a small ASME OM code Acceptable Range for pump operation, a smooth running pump could be subject to unnecessary corrective action if it exceeds this limit. Per the 1998 Edition of the ASME OM Code, Section ISTB-6200(a), "Corrective Action - Alert Range" if measured values fall within the alert range of Table ISTB-5100-1 the frequency of testing specified in ISTB-3400 shall be doubled until the cause of the deviation is determined and the condition is corrected.

In order to avoid unnecessary corrective actions, a minimum reference value of 0.05 in/sec is proposed, which would be applied to those pumps with individual vibration locations with reference values less than or equal to 0.05 in/sec. In this way, pumps with a measured reference value below 0.05 in/sec for a particular vibration

measurement location will have subsequent test results for that location compared to an ASME Acceptable Range limit of 0.125 in/sec and an ASME Alert Range limit of 0.300 in/sec.

NSPM requests authorization of this proposed alternative by September 30, 2012.

Enclosure 1 to this letter contains the Proposed Alternative request.

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



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Site Vice President
Prairie Island Nuclear Generating Plant Units 1 and 2
Northern States Power Company - Minnesota

Enclosure

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

ENCLOSURE 1

**Relief Request 12
Proposed Alternative for Pump Vibration Testing**

**Proposed Alternative
In Accordance with CFR 50.55a(a)(3)(i)**

Alternative Provides Acceptable Level of Quality and Safety

1. ASME Code Components Affected

Smooth Running Pumps - Components affected by this request are identified in Appendix A to this request.

2. Applicable Code Edition and Addenda

The Prairie Island Nuclear Generating Plant (PINGP) Fourth 10-Year Interval Inservice Testing (IST) program is based on the American Society of Mechanical Engineers (ASME), OM Code-1998, through 2000 Addenda.

3. Applicable Code Requirement

ISTB-3300, "Reference Values" (reference 1)

ISTB-3300(a), states: *"Initial reference values shall be determined from the results of testing meeting the requirements of ISTB-3100, 'Preservice Testing,' or from the results of the first inservice test."*

ISTB-3300(d), states: *"Reference values shall be established at a point(s) of operation (reference point) readily duplicated during subsequent tests."*

ISTB-3300(f), states: *"All subsequent test results shall be compared to these initial reference values or to new reference values established in accordance with ISTB-3310, ISTB-3320, or ISTB-6200(c)."*

ISTB-5120, "Inservice Testing" (reference 2) (Centrifugal Pumps, Except Vertical Line Shaft Centrifugal Pumps)

ISTB-5121(e) "Group A Test Procedure," and ISTB-5123(e), "Comprehensive Test Procedure," state: *"All deviations from the reference values shall be compared with the ranges of Table ISTB-5100-1 and corrective action taken as specified in ISTB-6200. Vibration measurements shall be compared to both the relative and absolute criteria shown in the alert and required action ranges of*

Table-ISTB-5100-1. For example, if vibration exceeds either $6 V_r$, or 0.7 in./sec (1.7 cm/sec) the pump is in the required action range."

4. Reason for Request

The ASME OM Code, paragraph ISTB-3540, requires that for centrifugal pumps, vibration measurements shall be taken in a plane approximately perpendicular to the rotating shaft in two approximately orthogonal directions on each accessible pump-bearing housing. Measurement shall also be taken in the axial direction on each accessible pump thrust bearing housing. The paragraph requires that for vertical line shaft pumps that the vibration measurements are taken on the upper motor-bearing housing in three orthogonal directions including the axial direction. These measurements are required to be compared with the ASME OM Code vibration acceptance criteria as specified in Table ISTB-5100-1 (reference 3) to determine if the measured values are acceptable.

Table ISTB 5100-1 states that, if during an inservice test, a vibration measurement exceeds 2.5 times the previously established reference value (V_r), the pump is considered in the alert range. The frequency of testing is then doubled in accordance with paragraph ISTB-6200(a), until the cause of the deviation is determined and the condition is corrected and the vibration level returns to the acceptable range level. Pumps whose vibration is measured as greater than 6 times V_r are considered to be in the required action range, and must be declared inoperable until cause of the deviation has been determined and the condition is corrected. Per ISTB-3300, the vibration reference values shall be established only when the pump is known to be operating acceptably.

For pumps whose absolute magnitude of vibration is an order of magnitude below the absolute vibration limits in Table ISTB-5100-1, a relatively small increase in vibration magnitude may cause the pump to enter the alert or required action range. These instances may be attributed to variation in flow, instrument accuracy, or other noise sources that would not be representative of actual pump degradation. Pumps that operate in this region are typically referred to as "smooth-running." Based on a small acceptable range, a smooth running pump could be subjected to unnecessary corrective action.

The pumps identified in Appendix A represent pumps in the PINGP Inservice Test Program. Each of these pumps has at least one V_r value that is currently less than 0.05 in/sec.

In order to avoid unnecessary corrective actions, a minimum value for V_r of 0.05 in/sec is proposed. This minimum value would be applied to individual vibration locations for those pumps in Appendix A with reference vibration values less than or equal to 0.05 in/sec. Therefore, the smallest ASME OM Code Acceptable Range limit for any IST pump vibration measurement location would be no lower than 2.5 times V_r , or 0.125 in/sec, which is within the "fair" range of the "General Machinery

Vibration Severity Chart" (reference 7). Likewise, the smallest ASME OM Code Alert Range limit for any IST Pump vibration measurement location for which the pump would be inoperable would be no lower than 6 times V_r , or 0.300 in/sec.

ASME OM, Table ISTB-5100-1 specifies a vibration Acceptable Range of 0.325 to 0.7 in/sec for pumps ≥ 600 rpm. These limits are equivalent to the Vibration Severity Chart range of "Good" to "Very Rough." Pumps that fall within this range have their test frequency doubled to monitor the vibration trend. The limits proposed by this relief request are well below these limits.

In addition to the requirements of ISTB for inservice testing, pumps in the PINGP Inservice Test Program are also included in the PINGP Predictive Maintenance (PdM) Program. The PINGP PdM Program currently employs predictive monitoring techniques such as: vibration monitoring and analysis beyond that required by ISTB, bearing temperature trending, oil sampling and analysis, and/or thermography analysis as applicable.

If the measured parameters are outside the normal operating range or are determined by analysis to be trending toward an unacceptable degraded state, appropriate actions are taken that may include: initiation of a Condition Report (CR), increased monitoring to establish a rate of change, review of component specific information to identify the cause of the condition, and removal of the pump from service to perform maintenance. Experience gathered by the PINGP PdM Program has shown that changes in vibration levels in the range of 0.05 in/sec do not normally indicate significant degradation in pump performance.

It should be noted that pumps in the PINGP IST Program would remain in the PINGP PdM Program even if certain pumps have very low vibration readings and are considered to be smooth running pumps.

5. Proposed Alternative and Basis for Use

In lieu of applying the vibration acceptance criteria ranges specified in Table ISTB-5100-1 smooth running pumps with a measured reference value at or below 0.05 in/sec for a particular vibration measurement location would have subsequent test results for that location compared to an Acceptable Range limit of 0.125 in/sec and an Alert Range limit of 0.300 in/sec (based on a minimum reference value of 0.05 in/sec). These proposed ranges would be applied to vibration test results during both Group A tests and Comprehensive tests.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB identified above, it has been determined that this alternative would provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety without unnecessarily imposing corrective action since changes in vibration levels in the range of 0.05 in/sec do not normally indicate significant degradation in pump performance.

Using the provisions of this relief request as an alternative to the vibration acceptance criteria ranges specified in Table ISTB-5100-1 provides an acceptable level of quality and safety since the alternative provides reasonable assurance of pump operational readiness and the ability to detect pump degradation.

6. Duration of Proposed Alternative

The proposed alternative would be effective immediately and be effective during the Fourth Ten-Year Inservice Testing Interval.

7. Precedents

By letter dated May 21, 2004, as supplemented by letter dated July 9, 2004, Beaver Valley Power Station (BVPS) submitted a similar relief request (Relief Request PRR8). The BVPS relief request was approved by the NRC in a letter dated December 27, 2004 (ADAMS Accession No. ML043430042).

On March 28, 2007 BVPS again requested this relief request as part of transition to an updated ten-year interval IST program plan. The NRC approved the relief request again in a letter dated September 27, 2007 (ADAMS Accession No. ML072420376).

8. References

- 1) ISTB-3300, "Reference Values"
- 2) ISTB-5120, "Inservice Testing", (Centrifugal Pumps, Except Vertical Line Shaft Centrifugal Pumps)
- 3) Table ISTB-5100-1, "Centrifugal Pump Test Acceptance Criteria"
- 4) Not Used
- 5) Not Used
- 6) NUREG-1482, Rev.1, Section 5.4, "Monitoring Pump Vibration in Accordance with ISTB"
- 7) General Machinery Vibration Severity Chart provided by IRD Mechanalysis, Inc.

Appendix A

ASME Code Components Affected

Smooth Running Pumps

Unit	System	Pump ID	Description	Class	Speed (rpm)
1	ZH	045-591	121 Control Room Chilled Water Pump	3	1750
1	ZH	045-592	122 Control Room Chilled Water Pump	3	1750