

WASHINGTON, D.C. 20555-0001

May 1, 2018

Mr. Scott M. Sharp Vice President Northern States Power Company - Minnesota Prairie Island Nuclear Generating Plant 1717 Wakonade Drive East Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2 -

ISSUANCE OF AMENDMENT RE: SPECIAL HEAVY LIFTING DEVICE

NONDESTRUCTIVE EXAMINATION FREQUENCY (CAC NOS. MG0072 AND

MG0073; EPID L-2017-LLA-0280)

Dear Mr. Sharp:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 225 to Renewed Facility Operating License No. DPR-42 and Amendment No. 212 to Renewed Facility Operating License No. DPR-60 for the Prairie Island Nuclear Generating Plant, Units 1 and 2 (PINGP), respectively. The amendment consists of changes to the PINGP updated safety analysis report (USAR) in response to your application dated August 4, 2017, as supplemented by letter dated November 6, 2017.

The amendment revises PINGP USAR, Section 12.2.12.3, "Special Lifting Devices Evaluation," to modify the nondestructive examination inspection interval for special lifting devices from typically prior to each refueling outage to a 10-year interval. 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,

Robert F. Kuntz, Septior Project Manager

Plant Licensing Branch III

Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-282 and 50-306

Enclosures:

1. Amendment No. 225 to DPR-42

2. Amendment No. 212 to DPR-60

3. Safety Evaluation

cc: ListServ



WASHINGTON, D.C. 20555-0001

NORTHERN STATES POWER COMPANY

DOCKET NO. 50-282

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 1 AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 225 License No. DPR-42

- 1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Northern States Power Company (the licensee) dated August 4, 2017, as supplemented by letter dated November 6, 2017, 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.
- Accordingly, by Amendment No. 225, Renewed Facility Operating License No. DPR-42
 is hereby amended to authorize revision to the Prairie Island Nuclear Generating Plant,
 Units 1 and 2, Updated Safety Analysis Report as set forth in the licensee's application
 dated August 4, 2017, as supplemented by letter dated November 6, 2017, and
 evaluated in the NRC staff's safety evaluation enclosed with this amendment.

This license amendment is effective as of its date of issuance and shall be implemented 3. within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona, Chief

Plant Licensing Branch III

Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation

Date of Issuance: May 1, 2018



WASHINGTON, D.C. 20555-0001

NORTHERN STATES POWER COMPANY

DOCKET NO. 50-306

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 212 License No. DPR-60

- 1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Northern States Power Company (the licensee) dated August 4, 2017, as supplemented by letter dated November 6, 2017, 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.
- Accordingly, by Amendment No. 212, Renewed Facility Operating License No. DPR-60
 is hereby amended to authorize revision to the Prairie Island Nuclear Generating Plant,
 Units 1 and 2, Updated Safety Analysis Report as set forth in the licensee's application
 dated August 4, 2017, as supplemented by letter dated November 6, 2017, and
 evaluated in the NRC staff's safety evaluation enclosed with this amendment.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

David J. Wrona, Chief Plant Licensing Branch III

Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Date of Issuance: May 1, 2018



WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 225

TO RENEWED FACILITY OPERATING LICENSE NO. DPR-42

AND AMENDMENT NO. 212 TO

RENEWED FACILITY OPERATING LICENSE NO. DPR-60

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2

DOCKET NOS. 50-282 AND 50-306

1.0 INTRODUCTION

By application dated August 4, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17216A236), as supplemented by letter dated November 6, 2017 (ADAMS Accession No. ML17310B131), Northern States Power Company (the licensee or NSPM) requested an amendment to the licensing basis for the Prairie Island Nuclear Generating Plant, Units 1 and 2 (PINGP). The change would revise PINGP updated safety analysis report (USAR), Section 12.2.12.3, "Special Lifting Devices Evaluation," to modify the nondestructive examination (NDE) inspection interval for special lifting devices from annually or prior to each use, typically prior to each refueling outage, to a 10-year interval. The current NDE inspection interval is consistent with American National Standards Institute (ANSI) N14.6-1978, "American National Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500kg) or More for Nuclear Materials," and NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants - Resolution of Generic Technical Activity A-36," July 1980 (ADAMS Accession No. ML070250180).

The supplemental letter dated November 6, 2017, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC or Commission) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on September 26, 2017 (82 FR 44855).

2.0 REGULATORY EVALUATION

In a letter dated December 22, 1980, later identified as Generic Letter (GL) 80-113, as supplemented by GL 81-07, "Control of Heavy Loads," dated February 3, 1981, the NRC staff requested that all licensees describe how they satisfied the guidelines of NUREG-0612 at their facility and what additional modifications would be necessary to fully satisfy these guidelines. The NRC staff divided this request into two phases (Phase I and Phase II) for implementation by licensees. Phase I guidelines addressed measures for reducing the likelihood of dropping heavy loads and provided criteria for establishing safe load paths; procedures for load handling operations; training of crane operators; design, testing, inspection, and maintenance of cranes and special lifting devices; and selection and use of slings. Phase II guidelines addressed alternatives to reduce further the probability of a load handling accident or mitigate the consequences of heavy load drops.

In Section 5.1 of NUREG-0612, the NRC staff provided recommended guidelines to preserve defense-in-depth (DID) for the handling of heavy loads at nuclear power plants. The first element of the DID identified in Section 5.1 involved reducing the probability of a load drop by improving the reliability of the handling system components through design, operation, maintenance, and inspection of cranes and associated lifting devices to appropriate standards, as specified in Section 5.1.1 of NUREG-0612. Item (4) of Section 5.1.1 specified that special lifting devices used to handle heavy loads in the area of the reactor vessel and spent fuel pool, or in areas where an accidental load drop could damage safe shutdown systems, should satisfy the guidelines of ANSI N14.6-1978.

The licensee provided the following discussion addressing present conformance with the NUREG-0612 guidance for special lifting devices:

In responses to GL 80-113 dated February 3, 1982, and November 8, 1982 . . ., Northern States Power Company (NSP), a predecessor license holder for PINGP, indicated that the Special Lifting Devices at PINGP were designed and built by Westinghouse circa 1970-71, prior to the existence of ANSI N14.6-1978, and therefore "not in strict compliance with all the ANSI N14.6 requirements." The identified areas of non-strict compliance with ANSI N14.6-1978 and NUREG-0612 are summarized as:

- While high strength materials were used in construction of the Special Lifting Devices, the fracture toughness was not determined. However, per an analysis completed at the time, the resulting stresses were found to be within the allowable stresses.
- The Westinghouse Quality Release was considered to be an acceptable alternate for verifying that the criteria for certified material testing reports, NDE, and documentation required by Westinghouse drawings and purchasing documents were satisfied.
- An initial 150% load test followed by NDE of critical load bearing parts and welds was not performed. The devices were originally tested to 100% of the load. Furthermore, continued load testing to 150% of the maximum load is not possible at PINGP.
- Guideline 4 of NUREG-0612 requires that the stress design factor stated in section 3.2.1.1 of ANSI N14.6-1978 be based on combined maximum static and dynamic loads that could be imparted based on the characteristics of

the crane which will be used. NSP investigated applicable cranes and determined the maximum dynamic impact factor to be 3% which excluded the flexibility of the ropes and cranes.

One of the identified areas of non-strict compliance was that NSP was unable to utilize continued load testing to 150% of the maximum load as a method to verify continued acceptability per ANSI N14.6-1978 section 5.3.1(1). Therefore, NSP applied the combination of visual inspection and dimensional and NDE testing as outlined in ANSI N14.6-1978 section 5.3.1(2).

On June 6, 1983 [ADAMS Accession No. 8306170053], the NRC issued a safety evaluation (SE) for completion of the "Phase I Control of Heavy Loads issue for Prairie Island Nuclear Generating Plant Unit Nos. 1 and 2".... The staff concurred with the findings contained within the technical evaluation report (TER) completed by the Franklin Research Center which was attached to the SE. The TER concluded that the "special lifting devices subject to NUREG-0612 at Prairie Island Units 1 and 2 will provide a degree of mechanical reliability consistent with that inherent in Guideline 4" and "equivalent to that expected from an initial design in accordance with ANSI N14.6-1978."

The requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.34(b) specify, in part, that the final safety analysis report (SAR) include a description and analysis of the structures, systems, and components of the facility, with emphasis upon performance requirements and the evaluations required to show that safety functions will be accomplished. The requirements of 10 CFR 50.71(e) specify, in part, that licensees revise the SAR to include the effects of all safety analyses and evaluations performed by the licensee either in support of approved license amendments, or in support of conclusions that changes did not require a license amendment, and all analyses of new safety issues performed by or on behalf of the licensee at Commission request. The effects of these changes include appropriate revisions of descriptions in the SAR report such that the report (as updated) is complete and accurate. As a result of this requirement, the licensee incorporated maintenance and testing of special lifting devices into the PINGP USAR.

3.0 TECHNICAL EVALUATION

3.1 Background

The following special lifting devices at PINGP are subject to periodic NDE:

- Internals Lifting Rigs
- Reactor Head Lifting Rigs
- Turbine Spreader Assembly

The licensee provided the following descriptions of these components:

Internals Lifting Rigs:

There are two Internals Lifting Rigs, one per unit, which are designed to lift either the upper or lower internals assembly in their respective unit. The Internals Lifting Rigs are fairly simple mechanical systems assembled from structural members, clevises, lugs, and pins. During normal plant operations, the devices are stored

within the containment vessel of their respective units. The Internals Lifting Rigs are used to lift the upper internals assemblies every refueling outage while lifts of the lower internals assemblies are typically performed once every ten years in support of reactor vessel inspections. The lower internals assemblies are only lifted when all fuel is removed from the reactor vessel and are, therefore, not subject to NUREG-0612. The lower internals assembly is approximately three times the weight of the upper internals assembly and is used as the bounding load for evaluation of the design margins for the Internals Lifting Rigs. The Internals Lifting Rigs are used in conjunction with each unit's respective Containment Polar Crane.

Reactor Head Lifting Rigs:

As with the Internals Lifting Rigs, there are two Reactor Head Lifting Rigs, one per unit, designed to lift the reactor vessel head in their respective unit. The Reactor Head Lifting Rigs are also fairly simple mechanical systems assembled from structural members, clevises, lugs, and pins. The Reactor Head Lifting Rigs are permanently attached to and used when removing and replacing the reactor vessel heads and are used in conjunction with each unit's respective Containment Polar Crane.

Turbine Spreader Assembly:

The common Turbine Spreader Assembly is used for disassembly and reassembly of turbine components. The Turbine Spreader Assembly was designed as not having any nuclear significance since it is to be used only in the turbine building. This device is essentially an I-beam spreader assembly which transfers the weight from slings connected to the lifted component via yokes and beam hangers to slings connected to the crane hook to carry large turbine components. It is stored in the interior turbine building and used during major high-pressure and low-pressure turbine component as well as generator rotor inspections. These inspections are infrequent in nature, but may involve multiple lifts. The Turbine Spreader Assembly is used in conjunction with the Turbine Building Crane.

The Turbine Spreader Assembly is considered a Special Lifting Device because, while there is no safeguards equipment on the turbine floor itself, the Unit 1 switchgear (4.16kV and 480V) are located in a Design Class I equipment area between the Unit 1 and 2 turbine building areas below the operating floor. A load drop accident, which may perforate the 18 inch thick concrete floor or cause excessive scabbing, could potentially damage the buses. Administrative controls are in place to prevent such a load drop condition from occurring.

Prior to submitting the license amendment request to modify the NDE inspection interval, the licensee modified the NDE methods that may be used to evaluate the integrity of the PINGP special lifting devices under the provisions of 10 CFR 50.59, "Changes, tests and experiments." This change permits the use of a volumetric acoustic emission (AE) technique to be used instead of the surface NDE methods specified in ANSI N14.6-1978 (i.e., magnetic particle (MT) and liquid penetrant (PT) examinations).

3.2 Proposed Change

The licensee requested a change to the NDE inspection interval because the current interval is overly conservative for the usage at PINGP. The standard for design, fabrication, testing, and maintenance of the special lifting devices is ANSI N14.6-1978. This standard applies to a range of special lifting devices used with heavy objects, including applications where the special lifting devices and associated containers for radioactive material are in frequent use and shipped between sites. At PINGP, the licensee uses the special lifting devices under controlled conditions and at low frequencies.

The current PINGP licensing basis for special lifting device NDE inspection interval is specified in Section 12.2.12.3 of the PINGP USAR, which states:

Visual inspection and non-destructive examination (NDE) testing of major load carrying welds and any other critical areas is performed consistent with ANSI N14.6-1978 ...annually or prior to each use of the Special Lifting Device, typically at each refueling outage....

The licensee derived this interval from Section 5.3, "Testing to Verify Continuing Compliance," Subsection 5.3.1, of ANSI N14.6-1978.

The licensee proposed to extend the NDE test interval to 10 years. The licensee proposed to delete the portion of USAR, Section 12.2.12.3, referenced above and replace it with:

Load testing of the Special Lifting Devices is not required. Dimensional testing, visual inspection, and nondestructive testing of major load-carrying welds and critical areas are performed consistent with ANSI N14.6-1978, with the exception that nondestructive testing is conducted on a 10-year interval.

3.3 NRC Staff Evaluation

The NRC staff reviewed the bases the licensee presented supporting the increase in the NDE inspection interval to 10 years. The licensee determined that the proposed change to the NDE inspection interval would be appropriate considering the following factors:

- As part of the responses to GL 80-113, the licensee verified that the previously constructed PINGP special lifting devices had been constructed with factors of safety relative to material yield and ultimate stress that exceeded those specified in ANSI N14.6-1978.
- The specifications of ANSI N14.6-1978 were written for devices with much higher utilization rates than the utilization rates of the PINGP special lifting devices. The reactor head lifting rig and the internals lifting rig typically do not exceed two lifts per refueling outage for each device. Similarly, the turbine spreader assembly is typically used on a 10 year period for disassembly and reassembly of the 11 components in each unit that make up a significant portion of the high pressure turbine, low pressure turbine, and generator.
- The licensee continues to perform visual inspections and dimensional checks prior to each use, consistent with the ANSI N14.6-1978.

- The licensee reviewed available past NDE records to verify that no previous indications resulted in service-related defects or failures that affect the lifting function of the devices.
- The licensee stores the special lifting devices in indoor environments that reduce the potential for corrosion.

The NRC staff agreed that the above factors supported an increased NDE inspection interval. The staff evaluated the above factors as described in the subsequent paragraphs.

The NRC staff had previously assessed the quality and construction of the special lifting devices as part of the review of PINGP responses to GL 80-113 and found them acceptable. The lifting devices have margin to the conservative design criteria of ANSI N14.6, 1978, and the practices of the vendor provided reasonable assurance of quality. Therefore, the special lifting devices have sufficient excess structural capacity to perform their safety function even if minor indications of structural damage were to develop.

The use of the special lifting devices is far below the potential use for devices designed to ANSI N14.6, 1978. The reactor vessel head and reactor internals lifting devices would normally be used for 14 or fewer lifts over the course of 10 years. The turbine lift rig may see more use because it is shared between units and designed to lift more than one component, but its usage is similarly limited to unit outages. Considering the conservative design criteria and operating experience, the staff finds there is reasonable assurance that no material defect would develop into a significant loss of structural integrity over such a small number of lifts.

The continued performance of visual inspections and dimensional checks before use provides reasonable assurance that significant defects in the special lifting devices would be detected. The good operational experience provides some assurance that any material defect that develops is likely to be minor and not threaten the safety function of the lifting devices. The storage environment helps to ensure that only minor defects could develop by lessening the likelihood of any degradation due to corrosion.

The NRC staff noted that the revised PINGP USAR entry included new information regarding the type of NDE used for inspection of the special lifting devices. As indicated in Section 2.1, "Background," above, the current PINGP USAR specifies that a volumetric NDE method using AE technology may be used instead of the methods specified in ANSI N14.6, 1978. This previously implemented change in NDE type could affect the sensitivity to detection of minor indications, and, therefore the appropriateness of an NDE inspection interval increase. Consequently, the staff requested additional information regarding the quality standards and acceptance criteria applicable to this method and a comparison of the AE with the MT and PT testing specified in ANSI N14.6, 1978. In addition, the staff requested information addressing the operating experience with the various NDE methods.

The licensee provided the response to the requests for additional information in the Enclosure to the NSPM letter dated November 6, 2017. The licensee stated that AE is considered a special process, and control of AE examination quality standards, acceptance criteria, and detection sensitivity fall under NSPM's quality assurance program. The licensee provided detailed information addressing each of these topics.

The licensee identified a number of appropriate industry technical reports and national consensus standards covering procedures used for the AE examinations at PINGP. The standards address activities such as certification of NDE personnel, calibration of equipment,

and verification of appropriate AE system performance. Organizations providing these technical reports and standards included the Electric Power Research Institute, the American Society for Nondestructive Testing, ASTM International, and the American Society of Mechanical Engineers (Boiler and Pressure Vessel Code, Sections V and XI). These reports and standards developed by these reputable organizations help ensure effective employment of the AE technology to identify material defects and are similar to the specified standards for procedures, personnel qualification, and acceptance criteria in ANSI N14.6, 1978. Therefore, the NRC staff has reasonable assurance that the implementation of the AE method of NDE will be of a quality commensurate with the NDE methods specified in ANSI N14.6, 1978.

The licensee also described how the AE examination acceptance criteria would be used to evaluate an indication. The AE method is a volumetric examination that can detect if a flaw is present under load, and, with processing of the resulting data, can identify the location for future characterization. The criteria do not determine the acceptability or rejectability of a possible indication. Instead, the criteria are applied to determine if other techniques (visual, surface, or volumetric) should be used in order to locate and characterize (size, shape) an indication. The licensee described that AE, as a volumetric technique, provides a method of identifying the presence of material defects or deformation with greater reliability than surface NDE methods. The licensee specified the use of ultrasonic, MT, or PT for characterization of indications. Therefore, the staff finds the use of AE to be comparable to or better than the NDE methods specified in ANSI N14.6, 1978.

The NRC staff reviewed the licensee's operating experience with the special lifting devices and the few defects that NDE has identified since the implementation of the program for control of heavy loads at PINGP. The operating experience is consistent with the low probability of failure of the special lifting devices and the likelihood that the AE method of NDE will provide comparable or better flaw detection sensitivity than the NDE methods specified in ANSI N14.6, 1978.

3.4 NRC Staff Evaluation Conclusion

The NRC staff evaluated the proposed change in NDE frequency with the objectives outlined in Section 5.1 of NUREG-0612, which recommended guidelines to preserve DID for the handling of heavy loads at nuclear power plants. The first element of DID identified in Section 5.1 involved reducing the probability of a load drop by improving the reliability of the handling system components through design, operation, maintenance, and inspection of cranes and associated lifting devices to appropriate standards. The licensee has demonstrated that the NDE frequency of once per 10 years is appropriate for the special lifting devices at PINGP based on margin provided in the design, reliability of the lifting devices demonstrated thorough operating experience, and continued appropriate maintenance and inspection of the special lifting devices. Therefore, the staff finds that the change in NDE frequency is acceptable because analyses and evaluations continue to demonstrate that the safety functions of the special lifting devices will continue to be accomplished, consistent with the requirements of 10 CFR 50.34(b) and 10 CFR 50.71(e).

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Minnesota State official was notified of the proposed issuance of the amendment on April 16, 2018. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the 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 (82 FR 44855). 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.

6.0 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) there is reasonable assurance that 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 Contributor: S. Jones, NRR

Date of issuance: May 1, 2018

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2 -

ISSUANCE OF AMENDMENT RE: SPECIAL HEAVY LIFTING DEVICE

NONDESTRUCTIVE EXAMINATION FREQUENCY (CAC NOS. MG0072 AND

MG0073; EPID L-2017-LLA-0280) DATED MAY 1, 2018

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