



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

November 22, 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,
EXEMPTION FROM THE REQUIREMENTS OF 10 CFR SECTION 50.46 AND
APPENDIX K TO 10 CFR PART 50, TO ALLOW USE OF OPTIMIZED ZIRLO™
AS FUEL ROD CLADDING MATERIAL (TAC NOS. ME2790 AND ME2791)

Dear Mr. Schimmel:

The Nuclear Regulatory Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46, "Acceptance criteria for emergency core cooling systems [ECCS] for light-water nuclear power reactors," and Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," for the Prairie Island Nuclear Generating Plant, Units 1 and 2. This action is in response to your application dated November 24, 2009, as supplemented by letter dated May 26, 2010, to allow the use of Optimized ZIRLO™ for fuel rod cladding.

A copy of the exemption is enclosed. The exemption has been forwarded to the Office of the *Federal Register* for publication.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas J. Wengert".

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:
Exemption

cc w/encl: Distribution via Listserv

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
NORTHERN STATES POWER COMPANY - MINNESOTA
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2
DOCKET NOS. 50-282 and 50-306
EXEMPTION

1.0 BACKGROUND

Northern States Power Company, a Minnesota corporation (NSPM, the licensee) is the holder of Facility Operating License Nos. DPR-42 and DPR-60, which authorize operation of the Prairie Island Nuclear Generating Plant, Units 1 and 2 (PINGP). The licenses provide, among other things, that the facility is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of two pressurized-water reactors located in Goodhue County in Minnesota.

2.0 REQUEST/ACTION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.12, "Specific exemptions," NSPM has, by letter dated November 24, 2009, as supplemented by letter dated May 26, 2010 (Agencywide Documents Access and Management System Accession Nos. ML093280883 and ML101480083, respectively), requested an exemption from 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," and Appendix K to 10 CFR 50, "ECCS Evaluation Models," (Appendix K). The regulations in 10 CFR 50.46 contain acceptance criteria for the emergency core cooling system (ECCS) for reactors fueled with zircaloy or ZIRLO™ cladding. In addition, Appendix K to 10 CFR Part 50 requires that the Baker-Just equation be used to predict the rates of energy

release, hydrogen concentration, and cladding oxidation from the metal/water reaction. The Baker-Just equation assumed the use of a zirconium alloy different than Optimized ZIRLO™. The exemption request relates solely to the specific types of cladding material specified in these regulations. As written, the regulations presume the use of zircaloy or ZIRLO™ fuel rod cladding. Thus, an exemption from the requirements of 10 CFR 50.46 and Appendix K is needed to support the use of different fuel rod cladding material. Therefore, the licensee requested an exemption that would allow the use of Optimized ZIRLO™ fuel rod cladding at PINGP. The NRC staff will prepare a separate safety evaluation, fully addressing NSPM's application for a related license amendment.

3.0 DISCUSSION

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present. Under 10 CFR 50.12(a)(2), special circumstances include, among other things, when application of the specific regulation in the particular circumstance would not serve, or is not necessary to achieve, the underlying purpose of the rule.

Authorized by Law

This exemption would allow the use of Optimized ZIRLO™ fuel rod cladding material at PINGP. As stated above, 10 CFR 50.12 allows the NRC to grant exemptions from the requirements of 10 CFR Part 50. The NRC staff has determined that granting of the licensee's proposed exemption will not result in a violation of the Atomic Energy Act of 1954, as amended, or the Commission's regulations. Therefore, the exemption is authorized by law.

No Undue Risk to Public Health and Safety

The underlying purpose of 10 CFR 50.46 is to establish acceptance criteria for ECCS performance. Westinghouse topical reports WCAP-12610-P-A and CENPD-404-P-A, Addendum 1-A, "Optimized ZIRLO™," dated July 2006, contain the justification to use Optimized ZIRLO™ fuel rod cladding material in addition to Zircaloy-4 and ZIRLO™ (these topical reports are non-publicly available because they contain proprietary information). The NRC staff approved the use of these topical reports, subject to the conditions stated in the staff's safety evaluations for each. In these topical reports, Westinghouse evaluated the structural and material properties of Optimized ZIRLO™ and determined that the use of Optimized ZIRLO™ as cladding would have either no significant impact or would produce a reduction in corrosion or oxidation and a corresponding reduction in hydrogen pickup. Westinghouse also evaluated the impact of Optimized ZIRLO™ fuel cladding on the loss-of-coolant accident (LOCA) and non-LOCA accident analyses. The evaluations determined that the LOCA analyses for fuel with Optimized ZIRLO™ cladding complied with 10 CFR 50.46, and that there was a negligible difference in the non-LOCA analyses between fuel clad with standard ZIRLO™ and fuel clad with Optimized ZIRLO™.

The underlying purpose of 10 CFR 50, Appendix K, Section I.A.5, "Metal-Water Reaction Rate," is to ensure that cladding oxidation and hydrogen generation are appropriately limited during a LOCA and conservatively accounted for in the ECCS evaluation model. Appendix K of 10 CFR 50 requires that the Baker-Just equation be used in the ECCS evaluation model to determine the rate of energy release, cladding oxidation, and hydrogen generation. Westinghouse has shown in WCAP-12610-P-A that the Baker-Just model is conservative in all post-LOCA scenarios with respect to the use of the Optimized ZIRLO™ advanced alloy as a fuel cladding material.

The NRC-approved topical reports have demonstrated that predicted chemical, thermal, and mechanical characteristics of the Optimized ZIRLO™ alloy cladding are bounding for those approved for ZIRLO™ under anticipated operational occurrences and postulated accidents. Reload cores are required to be operated in accordance with the operating limits specified in the technical specifications and the core operating limits report.

Based on the above, no new accident precursors are created by using Optimized ZIRLO™; thus, the probability of postulated accidents is not increased. Also, based on the above, the consequences of postulated accidents are not increased. Therefore, there is no undue risk to public health and safety due to using Optimized ZIRLO™.

Consistent with Common Defense and Security

The proposed exemption would allow the use of Optimized ZIRLO™ fuel rod cladding material at PINGP. This change to the plant configuration has no relation to security issues. Therefore, the common defense and security is not impacted by this exemption.

Special Circumstances

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present whenever application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The underlying purpose of 10 CFR 50.46 and Appendix K to 10 CFR Part 50 is to establish acceptance criteria for ECCS performance. The wording of the regulations in 10 CFR 50.46 and Appendix K is not directly applicable to Optimized ZIRLO™, even though the evaluations above show that the intent of the regulation is met. Therefore, since the underlying purposes of 10 CFR 50.46 and Appendix K are achieved through the use of Optimized ZIRLO™ fuel rod cladding material, the special circumstances required by 10 CFR 50.12(a)(2)(ii) for the granting of an exemption from 10 CFR 50.46 and Appendix K exist.

4.0 CONCLUSION

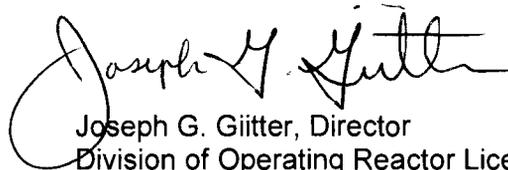
Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants NSPM an exemption from the requirements of 10 CFR 50.46 and Appendix K to 10 CFR Part 50, to allow the use of Optimized ZIRLO™ fuel rod cladding material, for the Prairie Island Nuclear Generating Plant, Units 1 and 2.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment as published in the *Federal Register* on October 14, 2010 (75 FR 63213).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 22nd day of November, 2010.

FOR THE NUCLEAR REGULATORY COMMISSION

A handwritten signature in black ink, appearing to read "Joseph G. Giitter". The signature is written in a cursive style with a large initial "J".

Joseph G. Giitter, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

November 22, 2010

Mr. Mark A. Schimmel
Site Vice President
Prairie Island Nuclear Generating Plant
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Sincerely,

/RA/

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

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Exemption

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DATE	10/28/2010	10/27/2010	9/13/2010	9/22/2010	10/29/2010	11/22/2010	11/22/2010

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