

October 16, 2006

Mr. Paul A. Harden
Site Vice President
Nuclear Management Company, LLC
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043-9530

SUBJECT: PALISADES NUCLEAR PLANT — EXEMPTION FROM THE REQUIREMENTS
OF 10 CFR PART 50, SECTION 50.46, AND APPENDIX K TO 10 CFR
PART 50 FOR USE OF M5 FUEL CLADDING (TAC NO. MC8576)

Dear Mr. Harden:

The Commission has approved the enclosed exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.46, and Appendix K to 10 CFR Part 50 for Palisades Nuclear Plant. This action is in response to your application dated October 4, 2005, as supplemented by letter dated June 14, 2006. Your application would allow the use of M5 advanced alloy in lieu of zircaloy or ZIRLO for fuel rod cladding in fuel assemblies at Palisades Nuclear Plant.

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

Sincerely,

/RA/

L. Mark Padovan, Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-255

Enclosure:
Exemption

cc w/encl: See next page

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*Previously concurred

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OFFICIAL RECORD COPY

Palisades Plant

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
NUCLEAR MANAGEMENT COMPANY, LLC
DOCKET NO. 50-255
PALISADES PLANT
EXEMPTION

1.0 BACKGROUND

Nuclear Management Company, LLC (NMC), is the holder of Facility Operating License No. DPR-20, which authorizes operation of the Palisades Nuclear Plant (Palisades). The license provides, 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 a pressurized-water reactor located in VanBuren County, Michigan.

2.0 REQUEST/ACTION

Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," requires that the calculated emergency core cooling system (ECCS) performance for reactors with zircaloy or ZIRLO fuel cladding meet certain criteria. Appendix K to 10 CFR Part 50, "ECCS Evaluation Models," presumes the use of zircaloy or ZIRLO fuel cladding when doing calculations for energy release, cladding oxidation, and hydrogen generation after a postulated loss-of-coolant accident.

Framatome ANP developed M5 advanced fuel rod cladding and fuel assembly structural material for high-burnup fuel applications. M5 is an alloy comprised primarily of zirconium (~99 percent) and niobium (~1 percent). The NRC staff approved the use of M5 material in topical report BAW-10227P-A, Revision 1, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," dated June 18, 2003. The M5 cladding is a proprietary, zirconium-based alloy that is chemically different from zircaloy or ZIRLO cladding materials, which are approved for use in the previously-mentioned NRC regulations. Therefore, a plant-specific exemption from these regulations is necessary to allow the use of M5 cladding. Accordingly, NMC's application of October 4, 2005, as supplemented June 14, 2006, requested an exemption from the requirements of 10 CFR 50.46 and Appendix K to 10 CFR Part 50 to allow the use of M5 fuel cladding at Palisades.

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 50.46 and Appendix K to 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.

Authorized by Law

This exemption would allow the use of M5 advanced alloy, in lieu of zircaloy or ZIRLO, for fuel rod cladding in fuel assemblies at Palisades. As stated above, 10 CFR 50.12 allows the NRC to grant exemptions from the requirements of 10 CFR Part 50.46 and Appendix K to 10 CFR Part 50. Therefore, the exemption is authorized by law.

No Undue Risk to Public Health and Safety

The staff has previously reviewed exemption requests for use of the M5 advanced alloy material for other pressurized-water reactors. Exemptions from 10 CFR 50.46 and 10 CFR Part 50, Appendix K, have been issued at Crystal River Unit 3 Nuclear Generating Plant and Arkansas Nuclear One, Unit 1.

In the approved topical report BAW-10227P-A, Revision 1, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," dated June 18, 2003, Framatome ANP demonstrated that the effectiveness of the ECCS will not be affected by a change from zircaloy fuel rod cladding to M5 fuel rod cladding. The analysis described in the topical report also demonstrated that the ECCS acceptance criteria applied to reactors fueled with zircaloy clad fuel are also applicable to reactors fueled with M5 fuel rod cladding.

Appendix K, paragraph I.A.5, of 10 CFR Part 50 ensures that cladding oxidation and hydrogen generation are appropriately limited during a loss-of-coolant accident (LOCA), and conservatively accounted for in the ECCS evaluation model. Appendix K 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. In the approved topical report BAW-10227P-A, Revision 1, Framatome ANP demonstrated that the Baker-Just model is conservative in all post-LOCA scenarios with respect to the use of the M5 advanced alloy as a fuel rod cladding material, and that the amount of hydrogen generated in an M5-clad core during a LOCA will remain within the Palisades design basis.

The NRC staff has reviewed the advanced cladding and structural material, M5, for pressurized-water reactor fuel mechanical designs as described in BAW-10227P-A, Revision 1. In its safety evaluation for this topical report, the NRC staff concluded that, to the extent and limitations specified in the staff's evaluation, the M5 properties and mechanical design methodology are acceptable for referencing in fuel reload licensing applications.

Based on the above, no new accident precursors are created by the use of M5 fuel cladding at Palisades; 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.

Consistent with Common Defense and Security

The proposed exemption would allow the use of M5 advanced alloy for fuel rod cladding in fuel assemblies at Palisades. This change to the plant 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, are present whenever application of the regulation in the particular circumstances would not serve the underlying purpose of the rule, or is not necessary to achieve the underlying purpose of the rule.

The underlying purpose of 10 CFR, Part 50.46, is to ensure that facilities have adequate acceptance criteria for ECCS. As discussed above, topical report BAW-10227P-A, Revision 1, demonstrated that the effectiveness of the ECCS will not be affected by a change from zircaloy fuel rod cladding to M5 fuel rod cladding. It also demonstrated that the ECCS acceptance criteria applied to reactors fueled with zircaloy clad fuel are applicable to reactors fueled with M5 fuel rod cladding.

The underlying purpose of 10 CFR, Part 50, Appendix K, paragraph I.A.5, is to ensure that cladding oxidation and hydrogen generation are appropriately limited during a LOCA and conservatively accounted for in the ECCS evaluation model. As mentioned above, topical report BAW-10227P-A, Revision 1, demonstrated that the Baker-Just model is conservative in all post-LOCA scenarios with respect to the use of the M5 advanced alloy as a fuel rod cladding material, and the staff concludes that the amount of hydrogen generated in an M5-clad core during a LOCA would remain within the Palisades design basis.

As previously mentioned, the NRC staff's review of the M5 material for pressurized-water reactor fuel mechanical designs concluded that, to the extent and limitations specified in the staff's evaluation, the M5 properties and mechanical design methodology are acceptable for referencing in fuel reload licensing applications.

Therefore, since the underlying purposes of 10 CFR 50.46 and 10 CFR Part 50, Appendix K, are achieved, the special circumstances required by these regulations for the granting of an exemption from 10 CFR 50.46 and 10 CFR Part 50 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 NMC an exemption from the requirements of 10 CFR 50.46 and 10 CFR Part 50, Appendix K, for Palisades.

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 (71 FR 58442).

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 16 day of October 2006.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Catherine Haney, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation