October 4, 2005

10 CFR 50.90
10 CFR 50.12

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

Palisades Nuclear Plant
Docket 50-255
License No. DPR-20

License Amendment Request to Support Use of M5 Fuel Cladding, and 10 CFR 50.46 and 10 CFR 50 Appendix K Exemption Request

Pursuant to 10 CFR 50.90, Nuclear Management Company, LLC (NMC) requests Nuclear Regulatory Commission (NRC) review and approval of a proposed license amendment for the Palisades Nuclear Plant. NMC proposes to revise Appendix A, Technical Specifications (TS), Core Operating Limits Report analytical methods referenced in Technical Specification (TS) 5.6.5.b, and the design features for fuel assemblies specified in TS 4.2.1.

The proposed change would add the Framatome Advanced Nuclear Power (FANP) report, "Incorporation of M5 Properties in Framatome ANP Approved Methods," to the analytical methods referenced in TS 5.6.5.b to permit the use of M5 alloy for fuel rod cladding and fuel assembly structural components in future operating cycles. The proposed change would also change the description of fuel assemblies specified in TS 4.2.1 to allow use of the M5 alloy.

This letter also requests an exemption pursuant to 10 CFR 50.12 from 10 CFR 50.46, Acceptance Criteria For Emergency Core Cooling Systems For Light-Water Nuclear Power Reactors, and 10 CFR 50 Appendix K, ECCS Evaluation Models. The M5 cladding is a zirconium-based alloy that is chemically different than Zircaloy or ZIRLO fuel cladding materials, which are approved for use in these 10 CFR sections. Therefore, a plant specific exemption from these regulations is required to support the use of M5 cladding. Information supporting the exemption requests is contained in Enclosure 4. NMC has concluded that special circumstances defined by 10 CFR 50.12 exist to warrant the exemptions and that granting the exemption requests will not present undue risk to the public health and safety and is consistent with the common defense and security.

Enclosure 1 provides a detailed description of the proposed change, background and technical analysis, No Significant Hazards Consideration Determination, and Environmental Review Consideration. Enclosure 2 provides the revised TS pages reflecting the proposed change. Enclosure 3 provides the annotated TS pages showing the changes proposed. Enclosure 4 provides a detailed description of the proposed exemption requests.

A previous submittal affected TS page 5.0-27, which is included in this request. In a license amendment request dated April 26, 2005 (TAC No. MC6827), NMC proposed a change to TS 5.6.5.b to address the fuel assembly growth correlation. The TS pages in enclosures 2 and 3 do not reflect the changes proposed in the previous submittal. NMC will coordinate changes to these pages with the NRC Project Manager to ensure proper TS page control when the associated license amendment requests are approved.

NMC requests approval of the proposed license amendment and proposed exemption requests by November 1, 2006, with the amendment being implemented within 90 days.

A copy of this request has been provided to the designated representative of the State of Michigan.

Summary of Commitments

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on October 4, 2005.

Paul A. Harden
Site Vice-President, Palisades Nuclear Plant
Nuclear Management Company, LLC

Enclosures (4)

CC Regional Administrator, Region III, USNRC
Project Manager, Palisades, USNRC
NRC Resident Inspector, Palisades USNRC

ENCLOSURE 1
DESCRIPTION OF REQUESTED CHANGES

1.0 DESCRIPTION

Nuclear Management Company, LLC (NMC) requests to amend Operating License DPR-20 for the Palisades Nuclear Plant (PNP) to permit the use of M5 alloy for fuel rod cladding and fuel assembly structural components in future operating cycles. The proposed change would revise the Appendix A, Technical Specifications (TS), Core Operating Limits Report (COLR) analytical methods referenced in Technical Specification (TS) 5.6.5.b, and TS 4.2.1, Fuel Assemblies.

The proposed change would add the Framatome Advanced Nuclear Power, Inc. (FANP) report "Incorporation of M5 Properties in Framatome ANP Approved Methods" to the analytical methods referenced in TS 5.6.5.b to permit the use of M5 alloy for fuel rod cladding and fuel assembly structural components in future operating cycles. The proposed change would also change the description of fuel assemblies specified in TS 4.2.1 to allow use of the M5 alloy.

2.0 PROPOSED CHANGE

NMC proposes to:

Revise TS 5.6.5.b to add BAW-10240 (P)-A, "Incorporation of M5 Properties in Framatome ANP Approved Methods."

Add the M5 advanced alloy to the description of fuel assemblies in TS 4.2.1.

3.0 BACKGROUND

Currently, the fuel cladding used at the PNP is Zircaloy-4, which is allowed by TS 4.2.1. FANP developed the M5 advanced fuel rod cladding and fuel assembly structural material. M5 is an alloy composed of primarily zirconium (approximately 99 percent) and niobium (approximately 1 percent) that has demonstrated superior corrosion resistance and reduced irradiation induced growth relative to both standard and low-tin zircaloy.

The M5 alloy would be used at the PNP for fuel rod cladding, as well as for fuel assembly spacer grids, fuel rod end plugs, and fuel assembly instrument tubes and guide bars.

4.0 TECHNICAL ANALYSIS

BAW-10240 (P)-A (Reference 1) describes the incorporation of the NRC-approved M5 material properties (References 2 and 3) into a set of NRC-approved mechanical analysis, small break loss-of-coolant accident (SBLOCA), and non-loss-of-coolant accident (non-LOCA) methodologies. Mechanical analysis methodology is summarized in Reference 4, the SBLOCA methodology is summarized in Reference 5, and the non-LOCA methodologies are summarized in References 6 and 7.

The PNP TS 5.6.5.b currently include three topical reports that were not considered in the evaluation presented in BAW-10240(P)-A:

> Topical reports ANF-84-73 Appendix B (Reference 9) and ANF-89-151(Reference 10) are non-LOCA transient analyses methodologies.
>
> Topical report XN-NF-621(Reference 11) describes a departure from nucleate boiling (DNB) correlation applicable to a Bi-metallic spacer.

BAW-10240(P)-A demonstrates that non-LOCA and DNB related topical reports do not require revision to address the use of M5 cladding since there is a negligible impact of the M5 cladding on non-LOCA transients and no impact on the DNB correlations. Therefore, continued reference to these three topical reports in the Palisades Technical Specifications is acceptable.

In order to analyze the large break LOCA for a future core containing M5 at PNP, NMC will submit a separate license amendment request to add the realistic large break LOCA Analysis topical report (Reference 8) to the Palisades TS 5.6.5.b.

All required safety limits for future operating cycles at the PNP would continue to be analyzed using methodologies approved by the NRC. Therefore, this proposed change will have no adverse impact on plant safety.

5.0 REGULATORY SAFETY ANALYSIS

5.1 No Significant Hazards Consideration

Nuclear Management Company, LLC (NMC) has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

The proposed license amendment adds a Nuclear Regulatory Commission approved analytical method, BAW-10240 (P)-A, "Incorporation of M5 Properties in Framatome ANP Approved Methods," used to determine the core operating limits, to Technical Specification (TS) 5.6.5.b and changes the description of fuel assemblies specified in TS 4.2.1 to allow use of the M5 alloy. The proposed amendment does not affect the acceptance criteria for any Final Safety Analysis Report (FSAR) safety analysis analyzed accidents and anticipated operational occurrences. As such, the proposed amendment does not increase the probability or consequences of an accident. The proposed amendment does not involve operation of the required structures, systems or components (SSCs) in a manner or configuration different from those previously recognized or evaluated.

Therefore, operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

Use of M5 clad fuel will not result in changes in the operation or configuration of the facility. Topical report BAW-10240(P)-A describes, by reference, that the material properties of the M5 alloy are similar or better than those of Zircaloy-4. Therefore, M5 fuel rod cladding and fuel assembly structural components will perform similarly to those fabricated from Zircaloy-4, thus precluding the possibility of the fuel becoming an accident initiator and causing a new or different type of accident.

Since the material properties of M5 alloy are similar or better than those of Zircaloy-4, there will be no significant changes in the types of any effluents that may be released off-site. There will not be a significant increase in occupational or public radiation exposure.

The proposed amendment does not involve operation of any required SSCs in a manner or configuration different from those previously recognized or evaluated. No new failure mechanisms will be introduced by the changes being requested.

Therefore, the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

The proposed change will not involve a significant reduction in the margin of safety because it has been demonstrated that the material properties of the M5 alloy are not significantly different from those of Zircaloy-4. M5 alloy is expected to perform similarly or better than Zircaloy-4 for all normal operating and accident scenarios, including both loss-of-coolant accident (LOCA) and non-LOCA scenarios. The proposed changes do not affect the acceptance criteria for any FSAR safety analysis analyzed accidents or anticipated operational occurrences. All required safety limits would continue to be analyzed using methodologies approved by the Nuclear Regulatory Commission.

Therefore, the proposed amendment would not involve a significant reduction in a margin of safety.

Based on the evaluation above, NMC concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

The proposed changes have been evaluated to determine whether applicable regulations and requirements continue to be met. NMC has determined that the proposed change that allows the use of M5 fuel rod cladding material requires exemptions from 10 CFR 50.46, Acceptance Criteria For Emergency Core Cooling Systems For Light-Water Nuclear Power Reactors and 10 CFR 50, Appendix K, ECCS Evaluation Models. Enclosure 4 provides the basis and justification for relief from these regulations. The proposed change does not require relief from other regulatory requirements, other than the TS, and does not affect conformance with any General Design Criterion differently than described in the FSAR.

In conclusion, based on the considerations described above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) 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.

6.0 ENVIRONMENTAL CONSIDERATION

NMC has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

7.0 PRECEDENCE

On July 25, 2005, Nuclear Regulatory Commission (NRC) approved a similar exemption request for Arkansas Nuclear One (ANO), Unit 1, Docket 50-313, License DPR-51 (TAC NO. MC4612). The scope included exemption from 10 CFR 50.46 and 10 CFR Part 50, Appendix K to allow use of the M5 advanced alloy for fuel rod cladding, and cited Topical Report BAW-10227(P)(A) (Reference 2). NMC's exemption request as described in Enclosure 4, also cites BAW-10227(P)(A). BAW-10240 (P)-A (Reference 1) describes the incorporation of the NRC-approved M5 material properties (References 2 and 3) into a set of NRC-approved mechanical analysis, SBLOCA, and non-LOCA methodologies. The NRC also approved a similar license amendment request for ANO Unit 1 on September 12, 2005. Amendment 226 revised Technical Specification 4.2.1, which describes design features for fuel assembles, to allow use of M5 alloy as fuel rod cladding and fuel assembly structural material. Amendment 226 also included other changes to the ANO Technical Specifications that are not applicable to Palisades.

8.0 REFERENCES

1. BAW-10240 (P)-A, Revision 0, "Incorporation of M5 Properties in Framatome ANP Approved Methods," dated May 2004.

2. BAW-10227(P)(A) Revision 1, "Evaluation of Advanced Cladding and Structural Material(M5) in PWR Reactor Fuel," Framatome ANP, June 2003

3. BAW-10231 P-A, "COPERNIC Fuel Rod Design Computer Code," Framatome Cogema Fuels, April 2002.

4. EMF-92-116(P)(A) Revision 0, "Generic Mechanical Design Criteria for PWR Fuel Designs," Siemens Power Corporation, February 1999.

5. EMF-2328(P)(A) Revision 0, "PWR Small Break LOCA Evaluation Model, S-RELAP5 Based," Framatome ANP Richland, Inc., March 2001.

6. EMF-2310(P)(A) Revision 0, "SRP Chapter 15 Non-LOCA Methodology for Pressurized Water Reactors," Framatome ANP Richland Inc., May 2001.

7. EMF-1961 (P)(A) Revision 0, "Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors," Siemens Power Corporation, July 2002.

8. EMF-2103 (P)(A), Revision 0, "Realistic Large Break LOCA Methodology for Pressurized Water Reactors," dated April 2003.

9. ANF-84-73 Appendix B (P)(A), "Advanced Nuclear Fuels Methodology for Pressurized Water Reactors: Analysis of Chapter 15 Events," Advanced Nuclear Fuels Corporation.

10. ANF-89-151(P)(A), "ANF-RELAP Methodology for Pressurized Water Reactors: Analysis of Non-LOCA Chapter 15 Events," Advanced Nuclear Fuels Corporation.

11. XN-NF-621(P)(A), "Exxon Nuclear DNB Correlation for PWR Fuel Designs," Exxon Nuclear Company.

ENCLOSURE 2

LICENSE AMENDMENT REQUEST TO SUPPORT USE OF M5 FUEL CLADDING, AND 10 CFR 50.46 AND 10 CFR 50 APPENDIX K EXEMPTION REQUEST

REVISED TECHNICAL SPECIFICATION PAGES 4.0-1 and 5.0-27
AND
OPERATING LICENSE PAGE CHANGE INSTRUCTIONS

3 Pages Follow

ATTACHMENT TO LICENSE AMENDMENT NO.

FACILITY OPERATING LICENSE NO. DPR-20

DOCKET NO. 50-255

Remove the following pages of Appendix A Technical Specifications and replace with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE	INSERT
4.0-1	4.0-1
5.0-27	5.0-27

4.0 DESIGN FEATURES

4.1 Site Location

The Palisades Nuclear Plant is located on property owned by Consumers Energy on the eastern shore of Lake Michigan approximately four and one-half miles south of the southern city limits of South Haven, Michigan. The minimum distance to the boundary of the exclusion area as defined in 10 CFR 100.3 shall be 677 meters.

4.2 Reactor Core

4.2.1 Fuel Assemblies

The reactor core shall contain 204 fuel assemblies. Each assembly shall consist of a matrix of zircaloy-4 or M5 clad fuel rods with an initial composition of depleted, natural, or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions. A core plug or plugs may be used to replace one or more fuel assemblies subject to the analysis of the resulting power distribution. Poison may be placed in the fuel bundles for long-term reactivity control.

4.2.2 Control Rod Assemblies

The reactor core shall contain 45 control rods. Four of these control rods may consist of part-length absorbers. The control material shall be silver-indium-cadmium, as approved by the NRC.

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The Region I fuel storage racks (See Figure B 3.7.16-1) are designed and shall be maintained with:

a. Fuel assemblies having a maximum planar average U-235 enrichment of 4.95 weight percent;

5.6 Reporting Requirements

5.6.5 COLR (continued)

14. EMF-92-116(P)(A), "Generic Mechanical Design Criteria for PWR Fuel Designs," Siemens Power Corporation. (LCOs 3.1.6, 3.2.1, 3.2.2, & 3.2.4)

15. EMF-2087(P)(A), "SEM/PWR-98: ECCS Evaluation Model for PWR LBLOCA Applications," Siemens Power Corporation. (LCOs 3.1.6, 3.2.1, & 3.2.2)

16. ANF-87-150 Volume 2, "Palisades Modified Reactor Protection System Report: Analysis of Chapter 15 Events," Advanced Nuclear Fuels Corporation. [Approved for use in the Palisades design during the NRC review of license Amendment 118, November 15, 1988] (LCOs 3.1.6, 3.2.1, 3.2.2, & 3.4.1)

17. EMF-1961(P)(A), Revision 0, Siemens Power Corporation, July 2000, "Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors." (LCOs 3.1.6, 3.2.1, 3.2.2, 3.2.4, & 3.4.1)

18. EMF-2328 (P)(A), Revision 0, Framatome ANP, Inc., March 2001, "PWR Small Break LOCA Evaluation Model, S-RELAP5 Based." (LCOs 3.1.6, 3.2.1, & 3.2.2)

19. BAW-10240 (P)-A, "Incorporation of M5 Properties in Framatome ANP Approved Methods." (LCOs 3.1.6, 3.2.1, & 3.2.2, 3.2.4, & 3.4.1)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, nuclear limits such as shutdown margin, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any mid cycle revisions or supplements, shall be provided, upon issuance for each reload cycle, to the NRC.

ENCLOSURE 3

LICENSE AMENDMENT REQUEST TO SUPPORT USE OF M5 FUEL CLADDING, AND 10 CFR 50.46 AND 10 CFR 50 APPENDIX K EXEMPTION REQUEST

MARK-UP OF TECHNICAL SPECIFICATION PAGES 4.0-1 and 5.0-27
(showing proposed changes)
(additions are highlighted; deletions are strikethrough)

2 Pages Follow

4.0 DESIGN FEATURES

4.1 Site Location

The Palisades Nuclear Plant is located on property owned by Consumers Energy on the eastern shore of Lake Michigan approximately four and one-half miles south of the southern city limits of South Haven, Michigan. The minimum distance to the boundary of the exclusion area as defined in 10 CFR 100.3 shall be 677 meters.

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4.2.1 Fuel Assemblies

The reactor core shall contain 204 fuel assemblies. Each assembly shall consist of a matrix of zircaloy-4 or M5 clad fuel rods with an initial composition of depleted, natural, or slightly enriched uranium dioxide (UO_2) as fuel material. Limited substitutions of zirconium alloy or stainless steel filler rods for fuel rods, in accordance with approved applications of fuel rod configurations, may be used. Fuel assemblies shall be limited to those fuel designs that have been analyzed with applicable NRC staff approved codes and methods and shown by tests or analyses to comply with all fuel safety design bases. A limited number of lead test assemblies that have not completed representative testing may be placed in nonlimiting core regions. A core plug or plugs may be used to replace one or more fuel assemblies subject to the analysis of the resulting power distribution. Poison may be placed in the fuel bundles for long-term reactivity control.

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4.3.1.1 The Region I fuel storage racks (See Figure B 3.7.16-1) are designed and shall be maintained with:

a. Fuel assemblies having a maximum planar average U-235 enrichment of 4.95 weight percent;

5.6 Reporting Requirements

5.6.5 COLR (continued)

14. EMF-92-116(P)(A), "Generic Mechanical Design Criteria for PWR Fuel Designs," Siemens Power Corporation. (LCOs 3.1.6, 3.2.1, 3.2.2, & 3.2.4)

15. EMF-2087(P)(A), "SEM/PWR-98: ECCS Evaluation Model for PWR LBLOCA Applications," Siemens Power Corporation. (LCOs 3.1.6, 3.2.1, & 3.2.2)

16. ANF-87-150 Volume 2, "Palisades Modified Reactor Protection System Report: Analysis of Chapter 15 Events," Advanced Nuclear Fuels Corporation. [Approved for use in the Palisades design during the NRC review of license Amendment 118, November 15, 1988] (LCOs 3.1.6, 3.2.1, 3.2.2, & 3.4.1)

17. EMF-1961(P)(A), Revision 0, Siemens Power Corporation, July 2000, "Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors." (LCOs 3.1.6, 3.2.1, 3.2.2, 3.2.4, & 3.4.1)

18. EMF-2328 (P)(A), Revision 0, Framatome ANP, Inc., March 2001, "PWR Small Break LOCA Evaluation Model, S-RELAP5 Based." (LCOs 3.1.6, 3.2.1, & 3.2.2)

19. BAW-10240 (P)-A, "Incorporation of M5 Properties in Framatome ANP Approved Methods." (LCOs 3.1.6, 3.2.1, 3.2.2, 3.2.4, & 3.4.1))

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems limits, nuclear limits such as shutdown margin, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any mid cycle revisions or supplements, shall be provided, upon issuance for each reload cycle, to the NRC.

ENCLOSURE 4
10 CFR 50.46 AND 10 CFR 50 APPENDIX K EXEMPTION REQUEST

In accordance with 10 CFR 50.12, *Specific Exemptions*, Nuclear Management Company, LLC (NMC) requests exemptions from the requirements specified in 10 CFR 50.46, *Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors*, and 10 CFR 50 Appendix K, *ECCS Evaluation Models*, paragraph I.A.5, regarding the use of Zircaloy or ZIRLO as a fuel rod cladding material at the Palisades Nuclear Plant. These exemption requests pertain to the proposed use of the M5 zirconium alloy for Palisades' fuel rod cladding and fuel assembly material.

10 CFR 50.12 states that the Commission may grant an exemption from requirements contained in 10 CFR 50 provided that: 1) the exemption is authorized by law, 2) the exemption will not result in an undue risk to public health and safety, 3) the exemption is consistent with the common defense and security, and 4) special circumstances, as defined in 10 CFR 50.12(a)(2) are present. The requested exemptions to allow the use of a zirconium alloy other than Zircaloy or ZIRLO for fuel cladding material at the Palisades Nuclear Plant satisfy these requirements as described below.

1. The requested exemption is authorized by law.

   Transition to an alternate, but equivalent fuel product is not precluded by law. The fuel that will be irradiated at Palisades contains cladding material that does not conform to the cladding material designations explicitly defined in 10 CFR 50.46 and 10 CFR 50, Appendix K. However, the criteria of these sections will continue to be satisfied for the operation of the Palisades core containing M5 fuel rod cladding and fuel assembly structural material.

2. The requested exemption does not present an undue risk to the public health and safety.

   The M5 fuel rod cladding and fuel assembly structural material will be evaluated by the fuel vendor prior to implementation of M5 fuel rod cladding and fuel assembly structural material to confirm that operation of this fuel product does not increase the probability of occurrence or the consequences of an accident and not create any new or different type of accident that could pose a risk to public health and safety. NMC, in conjunction with Framatome Advanced Nuclear Power (FANP), will utilize NRC approved methods for the reload design process for Palisades reload cores containing M5 fuel rod cladding and fuel assembly structural materials.

3. The requested exemption will not endanger the common defense and security.

   The M5 fuel rod cladding is similar in design to the current cladding material used at Palisades. The special nuclear material in this fuel product will continue to be handled and controlled in accordance with approved procedures. The fuel vendor will confirm through evaluation, that M5 fuel rod cladding and fuel assembly structural material will not endanger the common defense and security.

4. Special circumstances are present which necessitate the request of an exemption to the regulations of 10 CFR 50.46 and 10 CFR 50 Appendix K.

   10 CFR 50.46 provides various requirements for light water reactor system performance during and following a postulated loss-of-coolant accident (LOCA) for reactors containing uranium oxide fuel pellets clad in either zircaloy or ZIRLO. 10 CFR 50 Appendix K, Paragraph I.A.5, requires that the Baker-Just equation be used in emergency core cooling system (ECCS) evaluation models for determining the rate of energy release, hydrogen generation, and cladding oxidation for fuel rod cladding. Both of these regulations, either explicitly or implicitly, state or assume that either zircaloy or ZIRLO is to be used as the fuel rod cladding material.

   In order to accommodate the high fuel rod burnups that are required for today's modern fuel management schemes and core designs, FANP developed the M5 advanced fuel rod cladding and fuel assembly structural material. M5 is an alloy composed of primarily zirconium (approximately 99 percent) and niobium (approximately 1 percent) that has demonstrated superior corrosion resistance and reduced irradiation induced growth relative to both standard and low-tin zircaloy.

   The M5 alloy would be used at Palisades for fuel rod cladding, as well as for fuel assembly spacer grids, fuel rod end plugs, and fuel assembly instrument tubes and guide bars. Such use of the M5 alloy at Palisades will be accompanied by increased performance margins with regard to fuel rod corrosion and fuel rod and fuel assembly growth.

   The chemical composition of the M5 advanced alloy differs from the specifications for either zircaloy or ZIRLO. Therefore, in the absence of the requested exemption, use of the M5 advanced alloy falls outside the language and intent of 10 CFR 50.46, and 10 CFR 50 Appendix K, Paragraph I.A.5.

   NMC believes, for the reasons described below, that the use of the M5 advanced alloy as a fuel rod cladding material achieves the underlying purposes of 10 CFR 50.46, and 10 CFR 50 Appendix K, Paragraph I.A.5.

   The underlying purpose of 10 CFR 50.46 is to ensure that facilities have adequate acceptance criteria for the ECCS. FANP demonstrates in the Topical Report BAW-10227(P)(A), "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel," (Reference 2) that the effectiveness of the ECCS will not be affected by a change from zircaloy fuel rod cladding to M5 fuel rod cladding. Analysis described in the reference also demonstrates that the ECCS acceptance criteria applied to reactors fueled with zircaloy clad fuel are also applicable to reactors fueled with M5 fuel rod cladding.

   Because the underlying purpose of 10 CFR 50.46 is achieved through the use of the M5 advanced alloy as a fuel rod cladding material, special circumstances are present under 10 CFR 50.12(a) (2) (ii) for granting an exemption to 10 CFR 50.46.

The underlying purpose of 10 CFR Appendix K, Paragraph I.A.5, are to ensure that cladding oxidation and hydrogen generation are appropriately limited during a LOCA and conservatively accounted for in the ECCS evaluation model. Specifically, 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. FANP demonstrates, in Appendix D of Reference 2, 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.

Because the underlying purposes of 10 CFR 50 Appendix K, Paragraph I.A.5 are achieved through the use of the M5 advanced alloy as a fuel rod cladding material, special circumstances are present under 10 CFR 50.12(a) (2) (ii) for granting exemptions to 10 CFR 50 Appendix K, Paragraph I.A.5.

Approval of this exemption request will allow the use of M5 advanced alloy as a fuel assembly material at the Palisades Nuclear Plant.