

May 2, 2001

Mr. Mark E. Warner
Vice President - TMI Unit 1
AmerGen Energy Company, LLC
P.O. Box 480
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SUBJECT: THREE MILE ISLAND NUCLEAR STATION, UNIT 1(TMI-1) -
ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT
IMPACT RE: EXEMPTION FROM 10 CFR 50.44, 50.46, AND APPENDIX K
(TAC NO. MB0787)

Dear Mr. Warner:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for exemption dated December 20, 2000, as supplemented on March 14, 2001. The proposed exemption would allow the expanded use of M5 advanced alloy for fuel rod cladding and fuel spacer grids at TMI-1.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

/RA/

Timothy G. Colburn, Senior Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosure: Environmental Assessment

cc w/encl: See next page

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Three Mile Island Nuclear Station, Unit No. 1

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UNITED STATES NUCLEAR REGULATORY COMMISSION

AMERGEN ENERGY COMPANY, LLC

DOCKET NO. 50-289

THREE MILE ISLAND NUCLEAR STATION, UNIT 1

ENVIRONMENTAL ASSESSMENT AND FINDING OF

NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of an exemption from certain provisions of Sections 50.44 and 50.46 and Appendix K of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 for Facility Operating License No. DPR-50, issued to AmerGen Energy Company, LLC (the licensee), for operation of the Three Mile Island Nuclear Station, Unit 1 (TMI-1), located in Dauphin County, Pennsylvania.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The licensee requests an exemption from the provisions of: (1) 10 CFR 50.44, "Standards for combustible gas control system in light-water-cooled power reactors," which provide requirements to control hydrogen generated by Zircaloy or ZIRLO fuel cladding after a postulated loss-of-coolant accident (LOCA); (2) 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," which requires the calculated emergency core cooling system (ECCS) performance for reactors with Zircaloy or ZIRLO fuel cladding to meet certain criteria; and (3) Appendix K, "ECCS Evaluation Models," which presumes the use of Zircaloy or ZIRLO fuel cladding when doing calculations for energy release, cladding oxidation, and hydrogen generation after a postulated LOCA.

The proposed action would allow the licensee to generally use the M5 advanced alloy for fuel rod cladding in fuel assemblies at TMI-1. Limited use of M5 alloy in demonstration assemblies at TMI-1 had previously been approved. M5 alloy would also be used in fuel assembly spacer grids and fuel rod end plugs and fuel assembly guide and instrument tubes. M5 alloy material would be used in lieu of Zircaloy or ZIRLO, the materials assumed to be used in the cited regulations. The fuel assemblies would be loaded into the TMI-1 reactor core during the refueling outage in the fall of 2001, and in use during Cycle 14 and beyond operation.

The proposed action is in accordance with the licensee's application for exemption dated December 20, 2000, as supplemented by letter dated March 14, 2001.

The Need for the Proposed Action:

Appendix K of 10 CFR Part 50 and 10 CFR 50.46(a)(1)(i) require the demonstration of adequate ECCS performance for light-water reactors that contain fuel consisting of uranium oxide pellets enclosed in Zircaloy or ZIRLO tubes. In addition, 10 CFR 50.44(a) addresses requirements to control hydrogen generated by Zircaloy or ZIRLO fuel after a postulated LOCA. Each of these three regulations, either implicitly or explicitly assume that either Zircaloy or ZIRLO is used as the fuel rod cladding material. In order to accommodate the high fuel rod burnups that are required for modern fuel management and core designs, Framatome Cogema Fuels (FCF), developed the M5 advanced fuel rod cladding and fuel assembly structural material. M5 is an alloy comprised primarily of zirconium (~99 percent) and niobium (~1 percent) that has demonstrated superior corrosion resistance and reduced irradiation induced growth relative to both standard and low-tin Zircaloy. However, since the chemical composition of the M5 advanced alloy differs from the specifications of either Zircaloy or ZIRLO, use of the M5 advanced alloy falls outside of the strict interpretation of these regulations. Therefore, approval of this exemption request is needed to permit the use of the M5 advanced

alloy as a fuel rod cladding material at TMI-1. Limited use of the M5 alloy in demonstration assemblies at TMI-1 had previously been approved.

Pursuant to 10 CFR 50.12, the NRC may grant exemptions which are authorized by law, will not present an undue risk to the health and safety of the public, and are consistent with the common defense and security, provided that special circumstances are present. Pursuant to 10 CFR 50.12(a)(2)(ii), the Commission believes that special circumstances 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 is to ensure that facilities have adequate acceptance criteria for ECCS. FCF demonstrates in its topical report BAW-10227P-A, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR [pressurized-water reactor] Reactor Fuel," submitted to the NRC for review and approval on September 30, 1997, and approved by the NRC in a letter dated February 4, 2000, 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 BAW-10227P-A 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. Therefore, since the underlying purpose of 10 CFR 50.46 is achieved through the use of the M5 advanced alloy as a fuel rod cladding material, the special circumstances required by 10 CFR 50.12(a)(2)(ii) for granting an exemption from 10 CFR 50.46 exist. The underlying purposes of 10 CFR 50.44 and Appendix K of 10 CFR 50 are to ensure that cladding oxidation and hydrogen generation are appropriately limited during a postulated LOCA and conservatively accounted for in the ECCS evaluation model. The NRC staff has evaluated the impact of using M5 advanced alloy as fuel cladding material and determined that the impact is within that considered in the design basis for TMI-1. Therefore, the underlying purposes of 10 CFR 50.44 and Appendix K of 10 CFR Part 50 are met. Since the underlying purposes of 10 CFR 50.44, 50.46, and Appendix K of

10 CFR Part 50 are achieved with the use of M5 advanced alloy as fuel rod cladding material, the special circumstances required by 10 CFR 50.12(a)(2)(ii) for granting the exemption are met.

Environmental Impacts of the Proposed Action:

The NRC has completed its evaluation of the proposed action and concludes that the use of M5 advanced alloy as fuel rod cladding will not have a detrimental effect during a postulated LOCA. The NRC staff has further determined that since the geometry differences between the M5 alloy and Zircaloy are slight and would have virtually no thermal-hydraulic effect while fuel rods utilizing the two alloys as cladding material are co-resident in the same core, there is no need for a mixed-core penalty in LOCA ECCS model evaluations to compensate for material differences.

The proposed action will not significantly increase the probability or consequences of accidents, no changes are being made in the types of any effluents that may be released off site, and there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential nonradiological impacts, the proposed action does not involve any historic sites. It does not affect nonradiological plant effluents and has no other environmental impact. Therefore, there are no significant nonradiological environmental impacts associated with the proposed action.

Accordingly, the NRC concludes that there are no significant environmental impacts associated with the proposed action.

Alternatives to the Proposed Action:

As an alternative to the proposed action, the staff considered denial of the proposed action (i.e., the “no-action” alternative). Denial of the application would result in no change in current environmental impacts. The environmental impacts of the proposed action and the alternative action are similar.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the Final Environmental Statement for the Three Mile Island Nuclear Station, Unit 1, dated December 1972.

Agencies and Persons Consulted:

In accordance with its stated policy, on April 4, 2001, the staff consulted with the Pennsylvania State official, Mr. Michael Murphy of the Bureau of Radiation Protection, regarding the environmental impact of the proposed action. The State official had no comments.

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the environmental assessment, the NRC concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the NRC has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated December 20, 2000, as supplemented by letter dated March 14, 2001. Documents may be examined, and/or copied for a fee, at the NRC's Public Document Room, located at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available

records will be accessible electronically from the ADAMS Public Library component on the NRC Web site, <http://www.nrc.gov> (the Electronic Reading Room).

Dated at Rockville, Maryland, this 2nd day of May 2001.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Timothy G. Colburn, Senior Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation