

October 23, 2001

Mr. Mark E. Warner  
Vice President - TMI Unit 1  
AmerGen Energy Company, LLC  
P.O. Box 480  
Middletown, PA 17057

SUBJECT: TMI-1 - ISSUANCE OF AMENDMENT RE: REACTOR COOLANT SYSTEM  
PRESSURE-TEMPERATURE SAFETY LIMITS (TAC NO. MB2076)

Dear Mr. Warner:

The Commission has issued the enclosed Amendment No. 238 to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit 1 (TMI-1), in response to your application dated May 31, 2001, as supplemented September 14 and October 18, 2001.

The amendment revises the TMI-1 Technical Specifications (TSs) to incorporate Cycle 14 specific limits for the variable low reactor coolant system pressure-temperature core protection safety limits. These changes are reflected in revisions to Figures 2.1-1 and 2.1-3 of the TSs and the related Bases.

A copy of the related safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

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

Enclosures: 1. Amendment No. 238 to DPR-50  
2. Safety Evaluation

cc w/encls: See next page

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AMERGEN ENERGY COMPANY, LLC

DOCKET NO. 50-289

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 238

License No. DPR-50

1. The Nuclear Regulatory Commission (the Commission or NRC) has found that:
  - A. The application for amendment by AmerGen Energy Company, LLC (the licensee), dated May 31, 2001, as supplemented September 14 and October 18, 2001, 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.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.c.(2) of Facility Operating License No. DPR-50 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 238, are hereby incorporated in the license. The AmerGen Energy Company, LLC shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance. The licensee's commitment in its October 18, 2001, letter shall be added as a Category A commitment to the Long Range Planning Program as controlled under License Condition 2.c.(9) prior to startup from the fall 2001 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by Peter Tam for /

L. Raghavan, Acting Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: October 23, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 238

FACILITY OPERATING LICENSE NO. DPR-50

DOCKET NO. 50-289

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

Remove

2-3

2-4a

2-4c

Insert

2-3

2-4a

2-4c

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 238 TO FACILITY OPERATING LICENSE NO. DPR-50  
AMERGEN ENERGY COMPANY, LLC  
THREE MILE ISLAND NUCLEAR STATION, UNIT 1  
DOCKET NO. 50-289

## 1.0 INTRODUCTION

By letter dated May 31, 2001 (Reference 1), as supplemented September 14, 2001 (Reference 2), and October 18, 2001, AmerGen Energy Company, LLC (the licensee), submitted a request for approval of changes to the Three Mile Island Nuclear Station, Unit 1 (TMI-1), Technical Specifications (TSs). The September 14 and October 18, 2001, letters provided additional clarifying information which did not change the initial proposed no significant hazards consideration determination or expand the amendment beyond the scope of the original notice (66 FR 36337). Camera-ready TS pages were provided by letter dated September 25, 2001.

The requested changes revise the TMI-1 TSs to incorporate Cycle 14 specific limits for the variable low reactor coolant system (RCS) pressure-temperature (PT) core protection safety limits. These changes are reflected in revisions to Figures 2.1-1 and 2.1-3 of the TSs and the related Bases.

## 2.0 BACKGROUND

The variable low RCS PT safety limits define the locus of points for which the minimum steady-state departure from nucleate boiling ratio (DNBR) is greater than or equal to the DNBR analysis limit for the critical heat flux (CHF) correlation being used. The Cycle 14 reload for TMI-1 involves replacing a portion of the fuel rods with the Framatome ANP Mark-B12 fuel design which contains a fine mesh debris filter. The filter alters the flow characteristics at the core inlet relative to the resident fuel designs resulting in a transition core DNB penalty. The licensee evaluated the hydraulic compatibility of the mixed core fuel designs (Mark-B8V/Mark-B10/Mark-B12) using Topical Report BAW-10179 P-A, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses" (Reference 3), to verify that the RCS PT safety limits were sufficient to prevent a violation of the DNBR.

In a conference call with the licensee on September 5, 2001, the Nuclear Regulatory Commission (NRC) staff requested additional information concerning the methodology used to determine the required minimum RCS flow rate necessary to offset the transition core penalty. The licensee's September 14, 2001, response to the NRC staff's request stated that it supported the proposed changes to its TSs by analyses performed using NRC-approved methodologies contained in Reference 3 and their plant-specific core operating limits report. The TMI-1 Cycle 14 core reload design analyses are based entirely on NRC-approved Framatome ANP methods described in Reference 3. To offset the DNB penalty due to the

mixed core fuel design and the fine mesh debris filter, the licensee proposed to increase the minimum TMI-1 RCS flow rate from 102% to 105.5% of the RCS design flow rate.

Additional changes to the TSs for the safety limits were necessary due to application of the methodologies provided in Reference 3. These included the following: 1) The use of a maximum core quality limit of 26% for the BWC (Babcock & Wilcox correlation) CHF correlation that revises the 2-pump and 3-pump limits specified in TS Figure 2.1-3, and 2) the revision of the pressure coordinates to reflect actual core outlet values in lieu of hot leg tap values.

### 3.0 EVALUATION

The licensee described the methodology used to determine the 105.5% flow rate in Reference 2. Framatome ANP performed the thermal-hydraulic DNB evaluation to determine the TMI-1 Cycle 14 reload PT safety limits with the LYNXT Code (Reference 4) and the crossflow applications techniques in Topical Report BAW-1829, "Thermal-Hydraulic Crossflow Applications" (Reference 5), in conjunction with the safety criteria and methodology described in Reference 3. This methodology demonstrates that the DNBR predictions defined in the record of analysis for TMI-1 Cycle 14, using the assumptions of a full Mark-B10 core and RCS flow rate of 102% of design flow, conservatively bound the DNBR predictions associated with the mixed core configuration using a higher minimum RCS flow rate of 105.5% of design flow. With the higher minimum RCS flow rate, all minimum DNBR predictions for the mixed core configuration were  $>1.18$  BWC as stated in Reference 2. The licensee provided information that confirmed that the actual RCS flow rate will be determined prior to every startup to verify it is greater than the required 105.5% of minimum RCS design flow rate.

Although the NRC staff has not reviewed and approved the methodology described in Reference 5 for generic use, the crossflow technique described therein is identical to and serves as the foundation for the crossflow models contained in the NRC-approved codes LYNX1, LYNX2, and LYNXT of Reference 4. Therefore, reference to and use of the BAW-1829 Topical Report is appropriate for this plant-specific application.

Additionally, TMI-1 will maintain the 105.5% value as the analysis of record for additional core modifications and analyses. The 105.5% limit will be specified in the TS Bases on page 2-3 and in Figure 2.1-3 for the four reactor coolant pump curve to explain its use in the development of Figures 2.1-1 and 2.1-3. Any change from use of the 105.5% value will require NRC staff review and approval, because the licensee shall enter this as a Category A commitment in its Long-Range Planning Program under License Condition 2.c.(9) as stated in the licensee's October 18, 2001, letter. The RCS PT safety limits in Figure 2.1-1 reflect those shown in Figure 2.1-3 for the condition of four reactor coolant pumps operating. Figures 2.1-1 and 2.1-3 define the regions of acceptable and unacceptable RCS operation.

In addition to the higher minimum RCS flow rate, Figures 2.1-1 and 2.1-3 of the TSs are revised to reflect the change in the core outlet pressure values specified and the maximum core quality limit consistent with methodologies described in Reference 3. The pressure coordinates are revised to reflect actual core outlet tap values in lieu of hot leg tap values using the approved methods in Reference 3. Additionally, a maximum core quality limit of 26% for the BWC CHF

correlation in accordance with Topical Report BAW-10179 P-A revises the 2-pump and 3-pump limits specified in Figure 2.1-3 and is described on page 2-3 in the TS Bases.

The licensee reevaluated the variable low pressure trip (VLPT) setpoint corresponding to the proposed change in the RCS PT protective limits. The value was determined using the approved methods in Reference 3. A comparison of this value to the exiting allowable value confirmed that the current VLPT setpoint remains conservative. The NRC staff agrees with this evaluation.

Based on the above evaluation, the NRC staff concludes that the proposed changes to the TSs are acceptable. The NRC staff determined that the licensee performed the necessary analyses for changes to the RCS PT safety limits and the TSs using approved NRC methodologies documented in Reference 3. Additionally, the changes resulted in safety limits bounded by those existing limits presently located in the TSs.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendment. The State official had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC 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 (66 FR 36337). 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) 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.

#### 7.0 REFERENCES

1. Letter from M. E. Warner (TMI-1) to U.S. Nuclear Regulatory Commission, "License Amendment Request No. 311 - Reactor Coolant System Pressure-Temperature Safety Limits," dated May 31, 2001.
2. Letter from M. P. Gallagher (TMI-1) to U.S. Nuclear Regulatory Commission, "Additional Information - License Amendment Request No. 311 - Reactor Coolant System Pressure-Temperature Safety Limits," dated September 14, 2001.

3. BAW-10179P-A, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses," Babcock & Wilcox, Lynchburg, Virginia, August 1993.
4. BAW-10156-A, Rev. 1, "LYNXT: Core Transient Thermal Hydraulic Program," Babcock & Wilcox, Lynchburg, Virginia, August 1993.
5. BAW-1829, "Thermal-Hydraulic Crossflow Applications," Babcock & Wilcox, Lynchburg, Virginia, April 1984.

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Date: October 23, 2001

Three Mile Island Nuclear Station, Unit No. 1

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