

August 14, 2003

Mr. John L. Skolds, Chairman  
and Chief Executive Officer  
AmerGen Energy Company, LLC  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: THREE MILE ISLAND NUCLEAR STATION, UNIT 1 (TMI-1), RE: DEFERRAL  
OF CONTAINMENT INTEGRATED LEAKAGE RATE TEST (TAC NO. MB6487)

Dear Mr. Skolds:

The Commission has issued the enclosed Amendment No. 244 to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station, Unit 1 (TMI-1), in response to your application dated September 30, 2002, as supplemented on March 19, 2003.

The amendment revises Technical Specification Section 6.8.5, "Reactor Building Leakage Rate Testing Program," to reflect a one-time deferral of the scheduled performance of the next Type A Containment Integrated Leakage Rate Test from October 2003 to no later than September 2008. This change increases the test frequency from once every 10 years to once every 15 years.

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/

Donna M. Skay, 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. 244 to DPR-50  
2. Safety Evaluation

cc w/encls: See next page

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\*\*See previous concurrence

\*SE provided. No substantive changes.

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OFFICIAL RECORD COPY

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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. 244  
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 September 30, 2002, as supplemented on March 19, 2003, 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. 244, 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.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA PTam for/*

Richard J. Laufer, 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: August 14, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 244

FACILITY OPERATING LICENSE NO. DPR-50

DOCKET NO. 50-289

Replace the following page of the Appendix A Technical Specifications with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

Remove

6-11c

Insert

6-11c

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 244 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 application dated September 30, 2002, as supplemented by letter dated March 19, 2003, AmerGen Energy Company, LLC (the licensee), requested changes to the Technical Specifications (TSs) for Three Mile Island Nuclear Station, Unit 1 (TMI-1). The supplement provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 12, 2002 (67 FR 68730).

The proposed amendments would revise Technical Specification Section 6.8.5, "Reactor Building Leakage Rate Testing Program," to reflect a one-time deferral of the scheduled performance of the next type A containment integrated leakage rate test (ILRT) from October 2003 to no later than September 2008

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix J, was revised in 1995 by the addition of Option B, "Performance Based Requirements." Option B requires that a type A test be conducted at a periodic interval based on historical performance of the overall containment system. TMI-1 TS Section 6.8.5, "Reactor Building Leakage Rate Testing Program," requires that leakage rate testing be performed as required by 10 CFR Part 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guidelines contained in Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995. This RG endorses, with certain exceptions, Nuclear Energy Institute's (NEI) Report 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 26, 1995. RG 1.163, Section C, "Regulatory Position" states, "licensees intending to comply with the Option B in the amendment to Appendix J should establish test intervals based upon the criteria in Section 11.0 of NEI 94-01, rather than using test intervals specified in ANSI/ANS-56.8-1994." NEI 94-01, Section 11, states that type A testing shall be performed at a frequency of at least once per 10 years. The licensee's proposed TS change is an extension of the currently specified 10-year interval for ILRT to a 15-year interval on a one-time basis. There are no changes to any Code or regulatory requirement or acceptance criteria.



A type A test is an overall (integrated) leakage rate test of the containment structure. NEI 94-01 specifies an initial test interval of 48 months, but allows an extended interval of 10 years, based upon two consecutive successful tests. There is also a provision for extending the test interval an additional 15 months in certain circumstances. The most recent two type A tests at TMI-1 have been successful, so the current interval requirement is 10 years. The leakage rate testing requirements of Option B of Appendix J, and the containment inservice inspection (ISI) requirements mandated by 10 CFR 50.55a complement each other in ensuring the leakage tightness and structure integrity of the containment.

The licensee is requesting an addition to TS 6.8.5 which would add an exception from the guidelines of RG 1.163 regarding the type A test interval. Specifically, the proposed TS states that the first type A test performed after the September 1993 type A test shall be performed no later than September 2008. The local leakage rate tests (type B and type C tests), including their schedules, are not affected by this request.

### 3.0 TECHNICAL EVALUATION

The staff has reviewed the licensee's regulatory and technical analysis in support of its proposed amendment which is described in Attachment 1 of its submittal dated September 30, 2002, and supplement dated March 19, 2003. The detailed evaluation below will support the conclusion that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by the 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.

#### 3.1 Licensee's proposal

The licensee has proposed to revise TS 6.8.5 to add the following after the end of the second paragraph:

as modified by the following exception to NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J":

- a. Section 9.2.3: The first Type A test performed after the September 1993 Type A test shall be performed no later than September 2008.

#### 3.2 ISI for Primary Containment Integrity

The TMI-1 containment pressure boundary consists of the containment structure, containment access penetrations, and other process piping and electrical penetrations. The integrity of the penetrations and isolation valves are verified through type B and type C local leakage rate tests (LLRTs) as required by 10 CFR 50, Appendix J, and the overall leakage-tight integrity of the primary containment is verified through an ILRT. These tests are performed to verify the essentially leakage-tight characteristics of the containment and are performed at the design-basis accident (DBA) pressure.

The last ILRT performed for TMI-1 was in September 1993. The next ILRT is scheduled for September 2003. With the extension of the ILRT time interval, the next overall verification will be performed no later than September 2008. In its submittals, the licensee provided information related to the ISI of the containment and discussed potential areas of weaknesses in the containment that may not be apparent in the risk assessment. The staff's evaluation of the licensee's request is discussed in the following paragraphs.

### 3.3 ISI Program at TMI-1: Methods and Schedule

The TMI-1 Containment ISI (CISI) Program was developed in accordance with subsections IWE, "Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Power Plants," and IWL, "Requirements for Class CC Concrete Components of Light-Water Cooled Power Plants," of Section XI, of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), 1992 Edition, with the 1992 Addenda, as modified by NRC final rulemaking to 10 CFR 50.55a published in the *Federal Register* on August 8, 1996 (61 FR 41313). The program defines the scope of accessible and inaccessible areas and components and contains information such as the inspection schedules and program relief requests. Program drawings provide detailed information regarding type of components, as-built information, etc. The CISI program is intended to provide controls necessary to assure detection of degradation affecting containment integrity.

The licensee stated that a reactor building liner general visual inspection of 100% of the accessible surfaces is performed on the TMI-1 containment at intervals described in the CISI program. The licensee also performs a VT-3 of the accessible liner courses of the TMI-1 reactor building containment liner.

Containment inspections also include an examination of pressure-retaining bolting. Pressure retaining bolting examinations are performed in accordance with ASME Code, Section XI, Exam Category E-G, Item No. E8.1. The TMI-1 Program requires 100% examination of all pressure-retaining bolting over the course of the 10-year interval, including all disassembled connections and exposed surfaces. Thirty-four percent of the bolting was examined during the first interval with no unacceptable conditions identified.

The first interval of the CISI program is effective from April 20, 2001, through April 19, 2011. The inspections performed by the licensee included the accessible containment surface areas, including structural attachments and penetrations, pressure-retaining bolting, and Class MC supports.

The NRC staff has concluded that the CISI Program at TMI-1 has been established and is being conducted in accordance with Section XI of the ASME Code and that the methods and schedule employed are acceptable.

### 3.4 Implementing IWE-1240 at TMI-1: Augmented Examination

Certain areas of containment may be more susceptible than others to corrosion. To address this potential problem, IWE-1240 requires licensees to identify any areas of the containment that might require augmented examination. In its September 30, 2002, letter, the licensee stated that no ASME Code, Section XI, repairs were required as a result of the augmented examination of the area adjacent to the moisture barrier.

During the 1999 refueling outage (T1R13), the licensee identified five areas where coating degradation had resulted in a localized containment liner metal loss of 1/16". These areas are in the vicinity of the containment building liner and the moisture barrier interface. An engineering evaluation demonstrated that the remaining wall thickness was adequate to perform its design-basis function. The degraded areas were cleaned and re-coated in accordance with the TMI-1 coating program. The areas were re-examined in 2001 during T1R14 and found to be acceptable with no degradation of the coating. The TMI-1 coating and repair program as it applies to containment coatings, has previously been reviewed by the NRC staff and found acceptable.

The NRC staff has concluded that the licensee has adequately applied the requirements of the ASME Code in making its determination that no areas of the containment require an augmented inspection.

### 3.5 Schedule for Examination and Testing of Seals, Gaskets and Bolts Providing Containment Pressure Boundary Integrity

Type A containment leakage tests evaluate the integrity of the entire containment; however, the most likely source of a containment leakage is through a penetration. To address this under the 10 CFR Part 50, Appendix J, Option B Program, those Type B penetrations that use resilient seals, gaskets, etc., are tested within the guidelines provided by Option B and RG 1.163. The testing program is set up so that 100 percent of all components are tested during each 10-year interval. Those components that do not fall under extended test frequencies are tested at least once every 30 months. Components that are not under extended test frequencies are either penetrations that are disassembled and reassembled each outage or are components that have not demonstrated acceptable performance history per the primary containment leakage rate program. Components that are disassembled and reassembled during an outage receive an as-found test prior to any work and an as-left test after all work is completed.

The Type B and C testing requirements will not be changed as a result of the proposed extended ILRT interval.

The NRC staff has concluded that the licensee has established a schedule for the examination of seals and gaskets, and for the examination and testing of bolted connections that is consistent with the applicable sections of both the ASME Code and 10 CFR Part 50, Appendix J, and is, therefore, acceptable.

### 3.6 Degradation of Inaccessible Side of the Containment Steel Shell

Under its IWE program, the licensee evaluates the acceptability of inaccessible areas of the containment steel shell if conditions exist in the accessible areas that could indicate the presence of, or result in, degradation to the inaccessible area. Section 50.55a(b)(2)(viii) of 10 CFR requires that this evaluation include the description of the type, estimated extent, and cause of the degradation as well as the examination results of each area and description of necessary corrective actions.

In its letter dated March 19, 2003, the licensee provided drawings showing the inaccessible areas of containment and the areas of augmented examinations. The inaccessible areas comprise a small portion of the containment surface area, approximately 15 to 20% of the liner above the basemat. The areas include those covered by concrete (structural members), behind ventilation ducts, covered by polar crane components, behind the elevator shaft, and covered by fuel transfer components. These areas are representative of other locations inspected by visual examination methods and would not be any more susceptible than the areas examined. The critical areas, such as penetrations and moisture barrier interfaces, are encompassed by the TMI-1 CISI Program.

On the basis of its review of the information provided in the licensee's TS change request and responses to the staff's questions, the NRC staff finds that: (1) the structural integrity of the containment vessel is verified through the periodic ISI conducted as required by Subsections IWE and IWL of the ASME Code, Section XI, and no augmented inspection is required; (2) the integrity of the penetrations and containment isolation valves are periodically verified through type B and type C tests as required by 10 CFR Part 50, Appendix J, and TMI-1 TSs; and (3) the licensee is employing an IWE program that requires them to estimate any potential degradation of inaccessible areas of the containments. Furthermore, the licensee made conservative risk assumptions regarding such degradation. The NRC staff concludes that the licensee's ISI program, as currently implemented, supports the one-time extension of the ILRT from 10 to 15 years.

### 3.7 Risk Impact Assessment

The licensee has performed a risk impact assessment of extending the type A test interval to 15 years. In performing the risk assessment, the licensee considered the guidelines of NEI 94-01, the methodology used in Electric Power Research Institute's (EPRI's) TR-104285, "Risk Impact Assessment of Revised Containment Leakage Rate Testing," and RG 1.174, "An Approach For Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis."

The basis for the current 10-year test interval is provided in Section 11.0 of NEI 94-01, Revision 0, and was established in 1995 during the development of the performance-based Option B to Appendix J. Section 11.0 of NEI 94-01 states that NUREG-1493, "Performance-Based Containment Leakage-Test Program," provided the technical basis to revise leakage rate testing requirements contained in Option B to Appendix J. The basis consisted of qualitative and quantitative assessments of the risk impact (in terms of increased public dose) associated with a range of extended leakage rate test intervals. To supplement this basis, industry undertook a similar study. The results of that study are documented in EPRI Research Project Report TR-104285.

The EPRI study used an analytical approach similar to that presented in NUREG-1493 for evaluating the incremental risk associated with increasing the interval for type A tests. The Appendix J, Option A, requirements that were in effect for TMI-1 early in the plant's life required an ILRT test frequency of three tests in 10 years. The EPRI study estimated that relaxing the test frequency from three tests in 10 years to one test in 10 years would increase the average time that a leakage that was detectable only by a type A test goes undetected from 18 to 60 months. Since type A tests only detect about 3 percent of the leakages (the rest

are identified during local leakage rate tests based on industry leakage rate data gathered from 1987 to 1993), this results in a 10 percent increase in the overall probability of leakage. The risk contribution of pre-existing leakage for the pressurized water reactor and boiling water reactor representative plants in the EPRI study confirmed the NUREG-1493 conclusion that a reduction in the frequency of type A tests from three tests in 10 years to one test in 20 years leads to an “imperceptible” increase in risk that is on the order of 0.2 percent and a fraction of one person-rem per year in increased public dose.

Building upon the methodology of the EPRI study, the licensee assessed the change in the predicted person-rem/year frequency. The licensee quantified the risk from sequences that have the potential to result in large releases if a pre-existing leakage were present. Since the Option B rulemaking in 1995, the staff has issued RG 1.174 on the use of probabilistic risk assessment (PRA) in evaluating risk-informed changes to a plant’s licensing basis. The licensee has proposed using RG 1.174 guidance to assess the acceptability of extending the type A test interval beyond that established during the Option B rulemaking.

RG 1.174 defines very small changes in the risk-acceptance guidelines as increases in core damage frequency (CDF) less than  $10^{-6}$  per year and increases in large early release frequency (LERF) less than  $10^{-7}$  per year. Since the type A test does not impact CDF, the relevant criterion is the change in LERF. The licensee has estimated the change in LERF for the proposed change and the cumulative change from the original three tests in a 10-year interval frequency. RG 1.174 also discusses defense-in-depth and encourages the use of risk analysis techniques to help ensure and show that key principles, such as the defense-in-depth philosophy, are met. The licensee estimated the change in the conditional containment failure probability for the proposed change to demonstrate that the defense-in-depth philosophy is met.

The following comparisons of risk from a change in test frequency from three tests in 10 years to one test in 15 years are considered to be bounding for the TMI-1 comparative frequencies of one test in 10 years to one test in 15 years. The following conclusions can be drawn from the analysis associated with extending the type A test frequency:

1. Given the change from a three in 10-year test frequency to a one in 15-year test frequency, the increase in the total integrated plant risk is estimated to be about 0.2 person-rem per year. This increase is comparable to that estimated in NUREG-1493, where it was concluded that a reduction in the frequency of tests from three-in-10 years to one-in-20 years leads to an “imperceptible” increase in risk. Therefore, the increase in the total integrated plant risk for the proposed change is considered small and supportive of the proposed change.
2. The increase in LERF resulting from a change in the type A test frequency from the original three-in-10 years to one-in-15 years is estimated to be  $1.7 \times 10^{-7}$  per year based on the internal events PRA, and  $6.3 \times 10^{-7}$  per year including both internal and external events. However, there is some likelihood that the flaws in the containment estimated as part of the Class 3b frequency would be detected as part of the IWE/IWL visual examination of the containment surfaces (as identified in ASME Code, Section XI, Subsections IWE and IWL). The most recent visual examination of the TMI-1 containment was performed in 2001. The next scheduled IWE/IWL containment

inspection is in 2003. Visual inspections are expected to be effective in detecting large flaws in the visible regions of containment, and this would reduce the impact of the extended test interval on LERF. The licensee's risk analysis considered the potential impact of age-related corrosion/degradation in inaccessible areas of the containment shell on the proposed change. The increase in LERF associated with corrosion events is estimated to be about  $2 \times 10^{-8}$  per year.

When the calculated increase in LERF is in the range of  $10^{-7}$  per year to  $10^{-6}$  per year, applications are considered if the total LERF is less than  $10^{-5}$  per year. The licensee estimates that the total LERF for internal and external events, including the impact of extending the ILRT interval, is approximately  $5.1 \times 10^{-6}$  per year. The staff concludes that increasing the type A interval to 15 years results in only a small change in LERF and is consistent with the acceptance guidelines of RG 1.174.

3. RG 1.174 also encourages the use of risk analysis techniques to help ensure and show that the proposed change is consistent with the defense-in-depth philosophy. Consistency with the defense-in-depth philosophy is maintained if a reasonable balance is preserved between prevention of core damage, prevention of containment failure, and consequence mitigation. The licensee estimates the change in the conditional containment failure probability to be an increase of 1.0 percentage point for the cumulative change of going from a test frequency of three-in-10 years to one-in-15 years. The staff finds that the defense-in-depth philosophy is maintained based on the small magnitude of the change in the conditional containment failure probability for the proposed amendment.

Based on these conclusions, the NRC staff finds that the increase in predicted risk due to the proposed change is within the acceptance guidelines while maintaining the defense-in-depth philosophy of RG 1.174 and, therefore, is acceptable.

#### 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 or changes an inspection or a surveillance requirement. 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 (67 FR 68730). 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.

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Date: August 14, 2003