



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

April 27, 2000

Mr. John B. Cotton  
Vice President, TMI Unit 1  
AmerGen Energy Company, LLC  
P.O. Box 480  
Middletown, PA 17057

SUBJECT: TMI-1 (THREE MILE ISLAND NUCLEAR STATION, UNIT 1) RELIEF REQUEST  
NOS. RR-1 THROUGH RR-7: IMPLEMENTATION OF SUBSECTIONS IWE  
AND IWL OF AMERICAN SOCIETY FOR MECHANICAL ENGINEERS (ASME)  
BOILER AND PRESSURE VESSEL CODE SECTION XI FOR CONTAINMENT  
INSPECTION (TAC NO. MA8118)

Dear Mr. Cotton:

As stated in the Federal Register on August 8, 1996 (61 FR 41303), the U.S. Nuclear Regulatory Commission (NRC) amended its regulations to incorporate by reference, the 1992 Edition and Addenda of Subsections IWE and IWL of Section XI of the ASME Code. Requirements for Inservice Inspection of Class MC and Class CC containments are provided in Section XI, Subsection IWE, "Requirements for Class (MC) Metallic Containment and Metallic Liners of Class (CC) Concrete Containment Components at Light-Water Cooled Plants," and Section XI, Subsection IWL, "Requirements for Class CC Concrete Components at Light-Water Cooled Plants." Compliance is required by September 9, 2001. By letter dated January 28, 2000, as supplemented March 2, 2000, AmerGen Energy Company, LLC, (AmerGen or the licensee) submitted a request of the NRC for relief from certain requirements of Section XI of the ASME Code.

The licensee requested seven reliefs (RR-1 through RR-7) related to seals and gaskets examinations, non-destructive examination personnel qualification and certification, preservice examination of reapplied paint or coatings, examinations required prior to paint or coating removal, successive examinations required after repair, bolt torque or tension testing, and visual examinations of concrete components. The licensee proposed alternative examinations and cited examples of similar previously approved reliefs requested on other Dockets. The licensee also requested NRC staff approval of the requested reliefs by August 2000.

Based on the information provided in the relief requests, the NRC staff has determined that for Relief Request Nos. RR-3 and RR-7, the licensee's proposed alternatives will provide an acceptable level of quality and safety. Therefore, the proposed alternatives may be authorized pursuant to 10 CFR 50.55a(a)(3)(i). For Relief Request Nos. RR-1, RR-2, RR-4, RR-5 and RR-6, the NRC staff has determined that compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, and that the licensee's proposed alternatives will provide reasonable assurance of containment pressure integrity. Therefore, these proposed alternatives may be authorized pursuant to 10 CFR 50.55a(a)(3)(ii). Enclosure 1 contains the NRC staff's safety evaluation,

J. Cotton

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April 27, 2000

and Enclosure 2 contains the summary of relief requests.

If you have any questions, please contact the project manager, Mr. Timothy G. Colburn, at 301-415-1402.

Sincerely,

**/RA original signed by E. Adensam for/**

Marsha Gamberoni, Acting Chief, Section 1  
Project Directorate 1  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosures: 1. Safety Evaluation  
2. Summary of Relief Requests

cc w/encls: See next page

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**\*Safety Evaluation from EMEB dated March 15, 2000. No major changes made. #See previous concurrence.**

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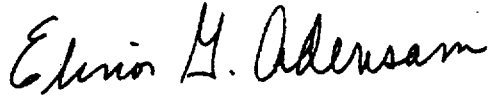
J. Cotton

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and Enclosure 2 contains the summary of relief requests.

If you have any questions, please contact the project manager, Mr. Timothy G. Colburn, at 301-415-1402.

Sincerely,



Marsha Gamberoni, Acting Chief, Section 1  
Project Directorate 1  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosures: 1. Safety Evaluation  
2. Summary of Relief Requests

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
OF RELIEF REQUESTS FROM ASME SECTION XI REQUIREMENTS  
FOR CONTAINMENT INSPECTION  
AMERGEN ENERGY COMPANY, LLC  
THREE MILE ISLAND NUCLEAR STATION, UNIT 1  
DOCKET NO. 50-289

1.0 INTRODUCTION

In the Federal Register dated August 8, 1996 (61 FR 41303), the U.S. Nuclear Regulatory Commission (NRC) amended its regulations to incorporate by reference the 1992 edition with 1992 addenda of Subsections IWE and IWL of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). Subsections IWE and IWL provide the requirements for inservice inspection (ISI) of Class CC (concrete containment), and Class MC (metallic containment) of light-water cooled power plants. The effective date for the amended rule was September 9, 1996, and it requires the licensees to incorporate the new requirements into their ISI plans and to complete the first containment inspection by September 9, 2001. However, a licensee may propose alternatives to or submit a request for relief from the requirements of the regulation pursuant to 10 CFR 50.55a(a)(3) or (g)(5).

By the letter dated January 28, 2000 (Reference 1), AmerGen Energy Company, LLC, (AmerGen or the licensee), proposed several alternatives to the requirements of Subsections IWE and IWL of Section XI of the ASME Code for its Three Mile Island Nuclear Station, Unit 1 (TMI Unit 1). In a letter dated March 2, 2000 (Reference 2), the licensee provided supplemental information for Relief Requests RR-1, RR-3, RR-4 and RR-7. The NRC's findings with respect to authorizing the alternative or denying the proposed request are discussed in this evaluation.

2.0 EVALUATION

2.1 Relief Request RR-1, "Containment Inspection, Seals and Gaskets"

2.1.1 Code Requirements

IWE-2500, Table IWE-2500-1 along with note 1, requires seals and gaskets on airlocks, hatches and other devices that are required to assure containment leak-tight be visually (VT-3) examined, once each interval to assure containment leak-tight integrity.

Enclosure 1

### 2.1.2 Specific Relief Requested:

Relief is requested from performing that Code-required Visual, VT-3, examinations on seals and gaskets within the scope of IWE 2500, Table IWE-2500-1 examination category E-D of the ASME Code, Section XI, 1992 Edition, 1992 Addenda.

### 2.1.3 Basis for Relief (per the licensee's relief request):

The following penetrations discussed below contain seals and gaskets:

- A. TMI Unit 1 has two types of electrical penetrations. One manufactured by Westinghouse for the reactor cooling pump cables and the other manufactured by General Electric for all other electrical penetrations.

1. Westinghouse ETD-type penetrations:

A welded penetration-to-nozzle configuration, with a non-visible 6061 aluminum seal. Penetrations of this type are pressurized with dry nitrogen to 15-20 psig. A pressure gauge is associated with each penetration for seal/penetration integrity.

2. General Electric 238X297G1-type penetrations:

Three basic types of penetrations exist, however the designs for all of these types are the same. Each penetration is welded to a nozzle, there are double seals at each end. Seals are made up of a potting compound along with epoxy inserted into the annulus holes. Both of these seals are inaccessible. Seal integrity is verified periodically with a general visual of the sealant coating and a check of the penetration seal pressure.

B. Equipment and Personnel containment penetration hatches:

The equipment and personnel hatches utilize flanged joints designed for use of a double gasket seal, along with an inner and outer door with gasket surfaces to ensure a leak-tight integrity. Both hatches also contain other gaskets and seals such as the hand-wheel shaft seals, electrical penetrations, blank flanges and equalizing pressure connections, which would require disassembly to gain access.

C. Reactor Building Purge Containment Isolation Valves:

The reactor building purge isolation valves are 48-inch diameter butterfly valves with ethylene propylene seats.

Components which penetrate and seal the containment boundary are leak tested in accordance with 10 CFR Part 50, Appendix J, Option B, test requirements. This testing includes leakage measurements of containment or penetrations (mechanical/electrical) whose design incorporates resilient seals, gaskets, and sealant compounds fitted with flexible metal seal assemblies. The IWE examination of these seals and gaskets would involve disassembly of the connections/joints that have otherwise been proven adequate through Appendix J testing. For electrical penetrations this would involve pre-maintenance Appendix J testing, de-termination of

electrical cables if enough slack is not available, disassembly of the joint, removal and examination of the seals and gaskets, reassembly of the joint, re-termination of cables if necessary, post-maintenance testing of cables and a post-maintenance Appendix J test of the penetration. In most cases new seals are required to be installed by the manufacturer, which would negate the VT-3 examination performed on the removed seals. The effort required to examine the mechanical penetrations and containment hatches would be similar except for the electrical portions.

Compliance with the Code would impose undue risk for equipment damage. The 1992 Edition, 1993 Addenda and later edition's and addenda's of ASME Section XI recognize that disassembly of connections/joints to perform these examinations is not warranted. As a result, Note 1 in the examination category E-D was modified to state that, "sealed or gasket connections need not be disassembled solely for the performance of examinations." However, without disassembly, most of the surface of the seals and or gaskets would be inaccessible.

#### 2.1.4 Proposed Alternative Examinations:

The leak-tightness of seals and gaskets will be tested in accordance with 10 CFR Part 50, Appendix J, Option B.

#### 2.1.5 Justification for Granting Relief (per the licensee's relief request):

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(i) and (ii). Testing the seals and gaskets in accordance with 10 CFR Part 50, Appendix J, Type B test, provides adequate assurance of the leak-tight integrity of the connections/joints. The Type B test has greater sensitivity and is a more appropriate examination to assure leak-tight integrity of the primary containment. Compliance with the requirements specified by Section XI, Subsection IWE, would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The performance of a visual (VT-3) examination would not increase the level of safety or quality of the connection/joint.

When the airlocks and hatches containing these materials are tested in accordance with 10 CFR Part 50, Appendix J, degradation of the seal or gasket material would be revealed by an increase in the leakage rate. Corrective measures would be applied and the component retested. Also, repair or replacement of seals and gaskets is not subjected to the ASME Section XI Code (1992 Edition, 1992 Addenda) rules in accordance with Paragraph IWA-4111(b)(5).

The equipment and personnel hatches are not normally removed during maintenance or refueling outages. However, both of these components are leak-rate tested as mentioned above. Where any one of the hatches is removed or leak-tightness has been compromised, an Appendix J, Type B test is performed, along with a visual examination of the sealing surfaces for damage or leak paths prior to start-up.

Also, in response to the staff's concern regarding the frequency (or schedule) for performing Appendix J, Option B (Type B tests) as an alternative to the requirements of Table IWE-2500-1, E-D (VT-3 examinations on seals and gaskets of containment penetrations), the licensee stated, in Reference 2, that the performance-based containment leakage test requirements of Option B of 10 CFR Part 50, Appendix J, were incorporated into TMI Unit 1 Technical

Specifications (TSs) with the issuance of License Amendment No. 201 on May 27, 1997. Those provisions were implemented in TMI Unit 1 Surveillance Procedure (SP) 1303-11.18, "Reactor Building Local Leak Rate Testing," which was next performed in September and October 1997. The TMI Unit 1 containment building leakage rate test program is documented in Topical Report No. 115, dated October 23, 1997. This includes the plant's approach to reduce the maximum extended test interval for Type B components (seals and gaskets) from 120 months to 60 months to match that used for Type C components (valves). With regard to the testing of penetrations and seals (except containment airlocks), the topical report states that: "Upon successful completion of two consecutive periodic as-found Type B tests, the Type B test interval may be increased up to a maximum of 60 months." If not eligible for extending tests, the Type B components are on a nominal fuel cycle (approximately 24 months) test interval, except for containment airlocks and the reactor building (RB) purge valves, which have nominal 6-month and 3-month test intervals, respectively. For any of the Type B components, whenever a seal or gasket is replaced, the local leak rate test (LLRT) is performed as part of the post-maintenance testing. In application of the maintenance rule, for Type B or Type C test results in excess of administrative limits, SP 1303-11.18 and Administrative Procedure (AP) 1001J, "Technical Specification Surveillance Testing Program," require that a corrective action program (CAP) be generated specifically for determining the maintenance rule impact. To resolve the CAP, engineering would be assigned to (1) investigate the deficiency and make a determination whether it was a functional failure, and if so whether it was maintenance preventable, and (2) recommend actions to correct the problem and prevent recurrence.

#### 2.1.6 Staff Evaluation of RR-1:

The licensee proposes to use, in lieu of performing the VT-3 examinations for containment penetration seals and gaskets, the existing primary containment leakage testing program for leakage testing containment penetrations in accordance with 10 CFR Part 50, Appendix J, Option B.

In its request, the licensee stated that because the seals and gaskets associated with these penetrations are not accessible for examination when the penetration is assembled, containment penetrations seals and gaskets must be disassembled and re-assembled for the purpose of performing the VT-3 visual examination. These activities (a pre-maintenance Appendix J test, de-termination of cables at electrical penetrations if enough cable slack is not available, disassembly of the joints, removal and examination of the seals and gaskets, re-assembly of the joints, re-termination of the cables if necessary, post-maintenance testing of cables, and post-maintenance Appendix J testing of the penetration) associated with a VT-3 visual examination would introduce the possibility of component damage that would not otherwise occur. The periodical test of penetrations in accordance with 10 CFR Part 50, Appendix J will detect local leakage at containment peak accident pressure and measure leakage across the leakage-limiting boundary of containment penetrations whose design incorporates resilient seals, gaskets, sealant compounds, and electrical penetrations fitted with flexible metal seal assemblies. If unacceptable leakage is identified during the test, corrective measures would be taken and components be retested.

Also, the staff finds that ASME Section XI, 1992 Edition, 1993 Addenda, recognizes that disassembly of joints for the sole purpose of performing visual examination is unwarranted. Requiring the licensee to disassemble components for the sole purpose of inspecting seals and gaskets would place a significant hardship on the licensee without a compensating increase in

the level of quality and safety. In addition, the frequencies (or schedules) for performing Appendix J, Option B (Type B tests) as an alternative to the requirements of Table IWE-2500-1, E-D (VT-3 examinations on seals and gaskets of containment penetrations) are consistent with those specified in the TS and plant-specific test programs. The maximum extended test interval for seals and gaskets may be increased up to a maximum of 60 months upon successful completion of two consecutive periodic Type B tests.

On the basis discussed above, the staff concludes that the alternative proposed by the licensee will provide reasonable assurance of the functionality and integrity of the containment penetration seals and gaskets during the testing required by 10 CFR Part 50, Appendix J. The proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the specific requirements of the Code would result in hardship without a compensating increase in the level of quality and safety.

## 2.2 Relief Request RR-2, "Containment Inspections, NDE Personnel Qualification and Certification"

### 2.2.1 Code Requirements

Subarticle IWA-2300, "Qualification of Nondestructive Examination Personnel," requires qualification of nondestructive examination personnel to the requirements of CP-189-1991, "Standard for Qualification and Certification of Nondestructive Testing Personnel," as amended by the ASME Section XI.

### 2.2.2 Specific Relief Requested:

Relief is requested from the provisions of Subarticle IWA-2300, "Qualification of Nondestructive Examination Personnel." This requires NDE personnel to be qualified and certified using a written practice in accordance with CP-189, "Standard for Qualification and Certification of Nondestructive Testing Personnel," as amended by the requirements of Subarticle IWA-2300.

### 2.2.3 Basis for Relief (per the licensee's relief request):

As cited in the Federal Register (61 FR 41303), 10 CFR 50.55a was amended to require the use of the 1992 Edition, 1992 Addenda, of Section XI, when performing containment examinations. In addition to the requirements of Subsection IWE, this also imposes the requirements of Subsection IWA, General Requirements, of the 1992 Edition, 1992 Addenda of Section XI. Subarticle IWA-2300 requires qualification of nondestructive examination personnel to CP-189, as amended by Subarticle IWA-2300.

A written practice based on the requirements of CP-189, as amended by the requirements of the Subarticle IWA-2300, to implement Subsection IWE duplicates efforts already in place for all other subsections. The TMI Unit 1 second 10-year ISI program is written to meet the 1986 Edition of Section XI with no addenda. Subarticle IWA-2300 of the 1986 Edition requires a written practice based on SNT-TC-1A, "Personnel Qualification and Certification of Nondestructive Testing," as amended by the requirements of Subarticle IWA-2300. Further, Subarticle IWA-2300 of the 1992 Edition, 1992 Addenda, states, "Certifications based on SNT-TC-1A are valid until recertification is required."

Visual examination is the primary nondestructive examination method required by Subsection IWE. Neither CP-189 nor SNT-TC-1A specifically includes visual examination. Therefore, the code requires qualification and certification to comparable levels as defined in CP-189 or SNT-TC-1A, as applicable, and the employer's written practice. Table IWE-2500-1 may also require ultrasonic thickness examinations. These examinations are relatively simple and do not require any extensive training and qualification program. Therefore, use of CP-189 in place of SNT-TC-1A will not improve the capability of the examination personnel to perform the visual and ultrasonic thickness examinations required by IWE.

Development and administration of a second program would not enhance safety or quality and would serve as a burden, particularly in developing a second written practice, tracking of certifications, and duplication of paperwork. This duplication would also apply to nondestructive examination (NDE) vendor programs.

#### 2.2.4 Proposed Alternative Examinations:

Examinations required by Subsection IWE shall be conducted by personnel qualified and certified to a written practice based on SNT-TC-1A and the 1986 Edition of Section XI with no addenda. Visual examination personnel receive specific training on conducting containment examinations.

#### 2.2.5 Justification for Granting Relief (per the licensee's relief request):

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(ii). Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The VT-3 examination technique is the primary NDE inspection method for the examination of containment. Neither SNT-TC-1A nor CP-189 contains visual requirements. AmerGen will also be updating its certification program in April 2001 to the NRC-approved code. This will dictate any change/update in the personnel certification programs.

#### 2.2.6 Staff Evaluation of RR-2:

In lieu of using the requirements of Section IWA-2300 of the 1992 Edition and Addenda of ASME Section XI that examination personnel be qualified and certified in accordance with ANSI/ASNT CP-189, "Standard for Qualification and Certification of Nondestructive Testing Personnel," the licensee proposes to conduct examinations with personnel qualified and certified to a written practice based on SNT-TC-1A and the 1986 Edition of ASME Section XI (with no addenda).

The staff recognizes that under the licensee inspection program, examinations are to be conducted by personnel qualified and certified to a written practice based on SNT-TC-1A in accordance with the 1986 Edition of ASME Section XI. The staff also realizes that a written practice based on the requirements of CP-189, as amended by the requirements of Section IWA-2300, to implement Sections IWE and IWL duplicates efforts already in place for all other subsections. To develop and to administer a second program would constitute a burden, particularly in developing a second written practice, tracking of certifications, and duplication of paperwork. In addition, Section IWA-2300 of the 1992 Edition, 1992 Addenda, states that

certification based on SNT-TC-1A is valid until recertification is required. Furthermore, in this request, AmerGen indicated that the certification program will be updated to the latest Code incorporated by reference in April 2001.

On the basis discussed above, the staff concludes that developing and implementing two qualification programs for NDE personnel would result in a burden on the licensee. The alternative proposed by the licensee will provide adequate qualifications for personnel performing containment examinations. Therefore, the request for relief is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the specific requirements of the Code would result in hardship without a compensating increase in the level of quality and safety.

### 2.3 Relief Request RR-3, "Containment Inspections, Preservice Examination of Reapplied Paint and Coatings"

#### 2.3.1 Code Requirements

ASME Section XI, 1992 Edition, 1992 Addenda, Subsection IWE-2200(g) requires that when paint or coatings are reapplied, the condition of the new paint or coating shall be documented in the preservice examination records.

#### 2.3.2 Specific Relief Requested:

Relief is requested from the requirement to perform a preservice inspection of new paint or coatings.

#### 2.3.3 Basis for Relief (per the licensee's relief request):

The paint or coatings on the containment boundary were not subjected to ASME Section XI rules for repair and replacement in accordance with IWA-4111(b)(5) during original application. The adequacy of the applied coatings is verified through the implementation of the TMI Unit 1 maintenance program and the AmerGen Operational Quality Assurance plan.

The maintenance and quality assurance programs for paint and protective coatings include planned and systematic actions necessary to provide adequate confidence that shop or field coating work will be performed satisfactorily.

The maintenance and quality assurance programs are applied to protective coatings consistent with the nature and scope of work.

Recording the condition of reapplied coating in the preservice record does not substantiate the containment structural integrity. Should deterioration of the coating occur in the reapplied area, that area would require additional evaluation regardless of the preservice record. Recording the condition of the new coating in the preservice records would not increase the level of quality or safety.

In SECY 96-080, "Issuance of final amendment to 10 CFR 50.55a to incorporate by reference the ASME Boiler and Pressure Vessel Code (ASME Code), Section XI, Division 1, Subsection IWE and IWL," dated April 17, 1996, the response to comment #3.2 regarding IWE-2200(g)

states: "In the NRC's opinion, this does not mean that a visual examination must be performed with every coating application. A visual examination of the topcoat to determine the soundness and the condition of the topcoat should be sufficient." This is currently accomplished through inspections directed by TMI Unit 1 maintenance procedures. For coatings inside containment, inspections are performed after every coat.

#### 2.3.4 Proposed Alternative Examinations:

Reapplied paint or coatings on the interior surfaces of the containment liner will be examined in accordance with the maintenance program and the AmerGen Operational Quality Assurance Plan. (Reference: NRC letter dated December 3, 1999, "Completion of Licensing Action for Generic Letter 98-04, 'Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-Of-Coolant Accident Because of Constructive and Protective Coating Deficiencies and Foreign Material in Containment,' dated July 14, 1998.")

#### 2.3.5 Justification for Granting Relief (per the licensee's relief request):

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(i), as the AmerGen Operational Quality Assurance (OQA) Plan currently provides an adequate level of quality and safety, as implemented through station programs and procedures.

#### 2.3.6 Staff Evaluation of RR-3:

In lieu of meeting the ASME Section XI, 1992 Edition, 1992 Addenda, Subsection IWE-2200(g) requirements to perform a preservice inspection of new paint or coatings, the licensee proposed to examine the paint and coatings in accordance with TMI's maintenance program and the OQA Plan. In the section of "Proposed Alternative Examinations," the licensee's statement implies that the maintenance program and the OQA plan requirements for performing examination meets the guidance of NRC Generic Letter 98-04. The licensee also committed that if any deterioration of the coating occurs in the reapplied area, that area would require additional evaluation regardless of the preservice record. In addition, the staff realizes that in SECY 96-080, the response to comment #3.2 regarding IWE-2200(g) states that in the NRC's opinion, this does not mean that a visual examination must be performed with every coating application. A visual examination of the topcoat to determine the soundness and the condition of the topcoat should be sufficient.

In the letter dated March 2, 2000 (Reference 2), the licensee provided additional details regarding how its OQA plan will be performed. The application of coatings at TMI Unit 1 is considered a special process. Section 6.3 of the OQA plan contains the requirements for special processes to ensure that these activities are accomplished under controlled conditions in accordance with applicable codes, standards, applications criteria, regulatory requirements and commitments. Additionally, Appendix C, Part 2, imposes Regulatory Guide 1.54, "Quality Assurance Requirements for Protective Coatings Applied to Water Cooled Nuclear Power Plants," with the stated exceptions.

Visual inspections for IWE are performed in accordance with the NDE/ISI procedure, NDE-VIS-06T, "Visual Examination (VT-I/VT-3) for Subsection IWE Class MC/CC Components." This procedure provides inspector certification requirements and the criteria for identification of degraded containment surfaces, including coating defects. The procedure

requires that if degradation is found which exceeds the acceptance criteria, the condition is reported under the TMI corrective action system and additional ultrasonic wall thickness measurements would be directed by engineering to characterize the liner prior to recoating the degraded location.

Coating applications required due to IWE visual inspection results are performed in accordance with Maintenance Procedure 1440-Y-5, "Preparation and Painting of Ferrous Metal Surfaces Inside the Reactor building." This procedure meets the requirements of ANSI N 101.4 and the requirements of the Regulatory Guide 1.54 as described in the QA plan. This procedure requires inspection of the surfaces to be coated prior to and between coating applications by Quality Verification (QV) personnel.

The staff finds that the alternative program, as described by the licensee, will provide an acceptable level of quality and safety for protecting the inside steel surfaces of the TMI Unit 1 containment. On this basis, the staff concludes that the licensee's alternative coating program is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

#### 2.4 Relief Request RR-4, "Containment Inspections, Examination Prior to Paint or Coating Removal"

##### 2.4.1 Code Requirements

ASME Section XI, 1992 Edition, 1992 Addenda, Subarticle IWE-2500(b) requires that when paint or coatings are to be removed, the paint or coatings shall be visually examined in accordance with Table IWE-2500-1 prior to removal.

##### 2.4.2 Specific Relief Requested:

Subarticle IWE-2500(b) requires that when paint or coatings are to be removed, the paint or coating shall be visually examined in accordance with Table IWE-2500-1 prior to removal. Relief is requested from the requirement to perform visual examinations of paint or coatings prior to removal.

##### 2.4.3 Basis for Relief (per the licensee's relief request):

As cited in the Federal Register (61 FR 41303), 10 CFR 50.55a was amended to require the use of the 1992 Edition, 1992 Addenda, of ASME Section XI when performing containment examinations. Paint and coatings were not subjected to code rules when they were originally applied and are not subject to ASME Section XI rules for repair or replacement in accordance with IWA-4111(b)(5). Degradation or discoloration of the paint or coating materials on the containment would be an indicator of potential degradation of the containment boundary. Additional measures would have to be employed to determine the nature and extent of any degradation, if present.

Periodic containment paint or coating examinations are performed in accordance with the AmerGen OQA Plan and the engineering coating monitoring procedure. The application of ASME Section XI rules for removal of paint or coatings, when related to an ASME Section XI repair or replacement activity, is a burden without a compensating increase in quality or safety.

#### 2.4.4 Proposed Alternative Examinations:

The condition of the containment liner base material will be verified by a visual examination prior to the application of new paint or coatings as required by the AmerGen OQA Plan. If degradation is identified, additional measures will be applied to determine if the containment boundary has been affected. Repairs to the primary containment boundary, if required, will be conducted in accordance with ASME Section XI Code rules.

#### 2.4.5 Justification for Granting Relief (per the licensee's relief request):

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(i). Coating inspection and application programs in accordance with the AmerGen OQA Plan provide an adequate level of quality and safety.

#### 2.4.6 Staff Evaluation of RR-4:

As discussed in the evaluation of Relief Request RR-3, the staff finds that the AmerGen's OQA plan is adequate for monitoring the proper removal of the old paint and application of new coatings. To perform additional examinations prior to removal of the old paint and to document the condition of the old paint or coatings, (in addition to the licensee's program subjected to the quality assurance requirements of 10 CFR Part 50, Appendix B), would result in hardship to the licensee without a compensating increase in the level of quality and safety. On this basis, the staff concludes that the alternative coating program proposed by the licensee is acceptable for authorizing the licensee's proposed alternative to the requirement of Subsection IWE-2500(b) of the Code pursuant to 10 CFR 50.55a(a)(3)(ii).

### 2.5 Relief Request RR-5, "Containment Inspections, Successive Examinations After Repair"

#### 2.5.1 Code Requirements

Paragraphs IWE-2420(b) and IWE-2420(c) of the 1992 Edition, 1992 Addenda of ASME Section XI, requires that when component examination results require evaluation of flaws, evaluation of areas of degradation, or repairs in accordance with Article IWE-3000, "Acceptance Standards," and the component is found to be acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be reexamined during the next inspection period listed in the schedule of the inspection program of Paragraph IWE-2411, "Inspection Program A," or Paragraph IWE-2412, "Inspection Program B," in accordance with Table IWE-2500-1, Examination Category E-C.

#### 2.5.2 Specific Relief Requested:

Relief is requested from the requirement of Paragraphs IWE-2420(b) and IWE-2420(c) to perform successive examination of repairs.

#### 2.5.3 Basis for Relief (per the licensee's relief request):

As cited in the Federal Register (61 FR 41303), 10 CFR 50.55a was amended to require the use of the 1992 Edition, 1992 Addenda, of Section XI, when performing containment examinations. The purpose of a repair is to restore the component to an acceptable condition

for continued service in accordance with the acceptance standards of Article IWE-3000. Paragraph IWA-4150, "Verification of Acceptability," requires the owner to conduct an evaluation of the suitability of the repair including consideration of the cause of failure.

If the repair has restored the component to an acceptable condition, successive examinations are not warranted. If the repair was not suitable, then the repair does not meet Code requirements and the component is not acceptable for continued service. Neither Paragraph IWB-2420(b), Paragraph IWC-2420(b), nor Paragraph IWD-2420(b) requires a repair to be subject to successive examination requirements. Furthermore, if the repair area is subject to accelerated degradation, it would still require augmented examination in accordance with Table IWE-2500-1, Examination Category E-C.

The successive examination of repairs in accordance with Paragraphs IWE-2420(b) and IWE-2420(c) constitutes a burden without a compensating increase in quality or safety.

In SECY 96-080, "Issuance of Final Amendment to 10 CFR 50.55a to Incorporate by Reference the ASME Boiler and Pressure Vessel Code (ASME Code), Section XI, Division 1, Subsection IWE and Subsection IWL," dated April 17, 1996, the response to comment # 3.3 states: "The purpose of IWE-2420(b) is to manage components found to be acceptable for continued service (meaning no repair or replacement at this time) as an Examination Category E-C component ... if the component had been repaired or replaced, then the more frequent examination would not be needed."

#### 2.5.4 Proposed Alternative Examinations:

Successive examinations in accordance with Paragraphs IWE-2420(b) and IWE-2420(c) are not required for repairs made in accordance with Article IWA-4000.

#### 2.5.5 Justification for Granting Relief (per the licensee's relief request):

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(ii) in that compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

#### 2.5.6 Staff Evaluation of RR-5:

The staff realizes that when repairs are complete, IWA-4150 requires licensees to evaluate the suitability of the repair. When a repair is required because of failure of an item, the evaluation shall consider the cause of failure to ensure that the repair is suitable. Considering that the failure mechanism is identified and corrected as required and the repair receives preservice examinations, as required, the proposed alternative will provide reasonable assurance of structural integrity. In doing this, the requirements of successive examinations are deemed to be unnecessary. Furthermore, IWB-2420(b), IWC-2420(b), and IWD-2420(b) do not require the successive inspection of repairs for ASME Code Class 1, 2, and 3 components as required in IWE-2420(b) for ASME Code Class MC components. Therefore, the request for relief is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) on the basis that compliance with the specific requirements of the Code would result in hardship without a compensating increase in the level of quality and safety.

## 2.6 Relief Request RR-6, "Containment Inspections, Bolt Torque or Tension Testing"

### 2.6.1 Code Requirements

ASME Section XI, 1992 Edition with the 1992 Addenda, Table IWE-2500-1, Examination Category E-G, Pressure Retaining Bolting, Item 8.20.

### 2.6.2 Specific Relief Requested:

Relief is requested from ASME Section XI, 1992 Edition, 1992 Addenda, Table IWE-2500-1 Examination Category E-G, Pressure Retaining Bolting, Item 8.20. Tables IWE-2500-1 requires a bolt torque or tension test on bolted connections that have not been disassembled and reassembled during the inspection interval.

### 2.6.3 Basis for Relief (per the licensee's relief request):

As cited in the Federal Register (61 FR 41303), 10 CFR 50.55a was amended to require the use of the 1992 Edition, 1992 Addenda, of ASME Section XI when performing containment examinations. Bolt torque or tension testing is required on bolted connections that have not been disassembled and reassembled during the inspection interval. Determination of the torque or tension value would require that the bolting be un-torqued and then re-torqued or re-tensioned.

Each containment penetration receives a 10 CFR Part 50, Appendix J, Type B test in accordance with the specified testing frequencies. As noted in 10 CFR Part 50, Appendix J, the purpose of Type B tests is to measure leakage of containment penetrations whose design incorporates resilient seals, gaskets, sealant compounds, and electrical penetrations fitted with flexible metal seal assemblies. The performance of the Type B test itself proves that the bolt torque or tension remains adequate to provide a leak rate that is within acceptable limits. The torque or tension value of bolting only becomes an issue if the leak rate is excessive. Once a bolt is torqued or tensioned, it is not subject to dynamic loading that could cause it to experience significant change. Appendix J testing and visual inspection is adequate to demonstrate that the design function is met. Torque or tension testing is not required for any other ASME Section XI, Class 1, 2, or 3, bolted connections or their supports as part of the ISI program.

### 2.6.4 Proposed Alternative Examinations:

The following examinations and tests required by Subsection IWE ensure the structural integrity and the leak-tightness of Class MC pressure retaining bolting, and, therefore, no additional alternative examinations are proposed:

1. Exposed surfaces of bolted connections shall be visually examined in accordance with requirements of Table IWE-2500-1, Examination Category E-G, Pressure Retaining Bolting, Item No. E8.10, and
2. Bolted connections shall meet the pressure test requirements of Table IWE-2500-1, Examination Category E-P, All Pressure Retaining Components, Item E9.40.

#### 2.6.5 Justification for Granting Relief (per the licensee's relief request):

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(ii) in that de-torquing and subsequent re-torquing of bolted connections which are verified not to experience unacceptable leakage through 10 CFR Part 50, Appendix J, Type B testing results in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The current configuration of the TMI Unit I containment does not incorporate any pressure unseating bolting for all piping and electrical penetrations. Only the equipment hatch has pressure unseating bolting and this bolting receives a 100-percent VT-1 examination of all accessible surfaces whenever the equipment hatch is periodically removed and scheduled for leak testing. Where bolting is used in the makeup of a pressure seal on the outward side of a piping penetration, it is accompanied with a seal on the inward side of containment.

#### 2.6.6 Staff Evaluation of RR-6:

ASME Section XI, 1992 Edition with the 1992 Addenda, Table IWE-2500-1, Examination Category E-G, Pressure Retaining Bolting, Item E8.20 requires bolt torque or tension testing on bolted connections that have not been disassembled and reassembled during the inspection interval. This examination is used to aid in the determination that leak-tight seals exist and that the structural integrity of the subject bolted connections is maintained. The licensee proposes to use the 10 CFR Part 50, Appendix J, Type B test together with visual examinations as an alternative to the Code requirement to verify the integrity of penetrations with bolted connections.

The staff realizes that bolt torque or tension testing on bolted connections that have not been disassembled and reassembled during the inspection interval would require the bolting be un-torqued and then re-torqued or re-tensioned, whereas the leak testing as required by 10 CFR Part 50, Appendix J, would adequately verify the leak-tight integrity of the containment. The staff also realizes that compliance with ASME Code requirements will cause a hardship or an usual difficulty because un-torquing and subsequent re-torquing bolted connections involves unnecessary radiation exposure and costs to perform the work without a compensating increase in the level of quality and safety. In addition, the staff finds that the alternative approach proposed by the licensee (the Type B test required by 10 CFR Part 50, Appendix J, to verify the leak-tight integrity of bolted connections for containment vessel leak-tight integrity together with visual examinations) will provide reasonable assurance of the containment pressure boundary integrity. On this basis, the staff concludes that the alternative proposed by the licensee is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

#### 2.7 Relief Request RR-7, "Containment Inspections, Visual Examinations of Concrete Containment"

##### 2.7.1 Code Requirements

ASME Section XI, 1992 Edition, 1992 Addenda, IWL-2310, "Visual Examination and Personnel Qualification," and IWA-2210, "Visual Examinations," require specific minimum illumination and maximum direct examination distance for all concrete surfaces.

#### 2.7.2 Specific Relief Requested:

Relief is requested from performing the code specified VT-1C and VT-3C illumination and distance requirements of IWL-2310(a) and (b) along with IWA-2210 and Table IWA-2210-1 Visual Examination of concrete surfaces, which establish required minimum illumination values (50 foot candles) and maximum direct viewing distances (2 feet and 4 feet for the VT-1C and VT-3C respectively).

#### 2.7.3 Basis for Relief (per the licensee's relief request):

In accordance with 10 CFR 50.55a(a)(3)(ii) relief is requested for TMI Unit 1 on the basis that compliance with the specified requirements would result in hardship and unusual difficulty without a compensating increase in the level of quality and safety.

As cited in the Federal Register (61 FR 41303), 10 CFR 50.55a was amended to require the use of the 1992 Edition, 1992 Addenda, of Section XI when performing containment examinations. In addition to the requirements of Subsection IWL, the rulemaking also imposes the requirements of Subsection IWA of the 1992 Edition, 1992 Addenda, Section XI, for the minimum illumination and maximum direct examination distance of Class CC components, specifically for the examination of concrete under paragraph IWL-2510. Accessibility to higher portions of the containment building is required thereby making it a hardship to obtain the minimum illumination and the maximum direct examination distance requirements.

The installation of temporary access equipment and high reach apparatuses would be necessary. This equipment would only provide limited access to the examination surfaces due to the geometry of the containment structure itself, but interferences would be encountered from the containment's structural design and mechanical/electrical equipment. The installation, use and removal of this equipment would increase personnel safety risk and personnel radiation exposure (for examination of the containment exterior surfaces within the auxiliary and fuel handling buildings) in order to meet paragraph IWA-2210 requirements.

#### 2.7.4 Proposed Alternative Examinations:

The use of 10 CFR 50.55a(b)(2)(ix)(B) applicable to IWE, which states that: "when performing remotely the visual examinations required by Subsection IWE, the maximum direct examination distance specified in Table IWA-2210-1 may be extended and the minimum illumination requirements specified in Table IWA-2210-1 may be decreased provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination." Visual examination techniques used to perform the visual examination of Class CC Concrete Components, Examination Category L-A, Concrete, Items L1.11 as applicable to IWL-2310, Visual Examination and Personnel Qualification and IWA-2210, Visual Examinations, shall be qualified as permitted by 10 CFR 50.55a(b)(2)(ix)(B) for components subject to examination in accordance with Subsection IWE.

#### 2.7.5 Justification for Granting Relief (per the licensee's relief request):

Relief is requested in accordance with 10 CFR 50.55a(a)(3)(ii). Qualified visual examination techniques of the Subsection IWL components (the outer containment surfaces), as has been

permitted by 10 CFR 50.55a(b)(2)(ix)(B) for the Subsection IWE components, provide an adequate level of quality and safety.

#### 2.7.6 Staff Evaluation of RR-7:

As described in the "Basis for Relief" Section above, because limited accessibility to higher portions of the containment building will make it a hardship to meet the maximum direct examination distance and minimum illumination requirements, the licensee proposed an alternative to the requirements for the measurement of illumination and examination distance for visual examinations specified in ASME Section XI, 1992 Edition, 1992 Addenda, IWL-2310, "Visual Examination and Personnel Qualification," and IWA-2210, "Visual Examination." The alternate examinations state that the Code-required maximum direct examination distance may be increased and the minimum illumination may be decreased provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination.

The visual examinations on containment are performed to determine if damage or degradation warrant additional evaluation or repair of the structure. In order for the visual examinations to be performed in such a way as to detect critical damage or degradation, proper distance and lighting are essential. The licensee stated in its request that visual examination techniques used to perform the visual examination of Class CC Concrete Components, Examination Category L-A, Concrete, Items L1.11 as applicable to IWL-2310, "Visual Examination and Personnel Qualification," and IWA 2210, "Visual Examinations," shall be qualified as permitted by 10 CFR 50.55a(b)(2)(ix)(B) for components subject to examination in accordance with Subsection IWE. However, the licensee did not provide a basis of how the 50.55a(b)(2)(ix)(B) requirements are met when the proposed alternative examination is performed.

In response to the staff's concern raised during the February 17, 2000, conference call, the licensee stated, in Reference 2, that visual, VT-3, inspections of the TMI Unit 1 CC in accordance with Subsection IWL were performed by Precision Surveillance Corporation (PSC) certified visual inspectors. Qualification of the visual technique to justify deviating from the lighting and distance requirements of Section XI, Subsection IWL, was performed by the PSC Visual Level III inspector and witnessed/approved by the Authorized Nuclear Insurance Inspector. The qualification demonstrated that the inspector could discriminate a 0.030" wide black line on a white and a gray placard at a measured distance in what was considered the worst lighting condition. A white and a gray placard were used to simulate the contrast expected from the range of concrete surfaces to be examined. The lines on the placard were derived from the inspection requirements of IWL-2310(b) and ACI 201.IR-68, "Guide for Making a Condition Survey of Concrete Structures." Different distances were qualified for unaided viewing or with the use of visual aids. Where it was necessary to deviate from the IWL requirement for being within 4 feet of the surface, the inspection was conducted within the qualified line of sight distance, using the same tools as necessary for lighting (flashlight) and vision (binoculars) as specified in the qualification.

On the basis discussed above, the staff finds that the alternative examinations proposed by the licensee provide an acceptable level of quality and safety and are therefore authorized pursuant to 10 CFR 50.55a(a)(3)(i).

### 3.0 CONCLUSION

Based on our review of the information provided in the requests for relief (RR-1 through RR-7), the staff concludes that for Relief Request Nos. RR-3 and RR-7, the licensee's proposed alternatives will provide an acceptable level of quality and safety. Therefore, the proposed alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(i). For Relief Request Nos. RR-1, RR-2, RR-4, RR-5, and RR-6, the staff concludes that compliance with the code requirements would result in a burden without a compensating increase in the level of quality and safety, and that the licensee's proposed alternatives will provide reasonable assurance of containment pressure integrity. Therefore, these proposed alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

Principal Contributors: T. Cheng  
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Date: **April 27, 2000**

#### 4.0 REFERENCES

1. Letter from John B. Cotton, AmerGen Energy Company, to the NRC, "Inservice Inspection (ISI) - Requests for Relief from ASME Boiler & Pressure Vessel Code Section XI, Subsection IWE and IWL Requirements," Three Mile Island, Unit 1, dated January 28, 2000.
2. Letter from John B. Cotton, AmerGen Energy Company, to the NRC, "Response to NRC Request for Additional Information Regarding Relief from ASME Boiler and Pressure Vessel Code Section XI, Subsections IWE and IWL Containment Inspection Requirements," Three Mile Island, Unit 1, dated March 2, 2000.

**Summary of Relief Requests  
Three Mile Island Nuclear Station, Unit 1**

Relief Request No.	10 CFR 50.55a - ASME Code IWE/IWL Section	Issue Identification	Recommended NRC Action	Remarks
RR-1	Table IWE-2500-1, E-D, E5.10 and E5.20	VT-3 examination of seals and gaskets	(a)(3)(ii)	authorized
RR-2	IWA-2300	qualification of NDE personnel	(a)(3)(ii)	authorized
RR-3	IWE-2200(g)	preservice examination of new paint or coatings	(a)(3)(i)	authorized
RR-4	IWE-2500(b)	visual examinations of paint and coatings prior to removal	(a)(3)(ii)	authorized
RR-5	IWE-2420(b) and (c)	successive examination after repairs	(a)(3)(ii)	authorized
RR-6	Table IWE-2500-1, E-G, Item E8.20	torque/tension test of pressure retaining bolting	(a)(3)(ii)	authorized
RR-7	IWL-2310	visual examination of concrete surface and personnel qualif.	(a)(3)(i)	authorized