

August 20, 2008

Mr. Michael P. Gallagher
Vice President License Renewal Projects
AmerGen Energy Company, LLC
200 Exelon Way
Kennett Square, PA 19348

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR SECTIONS 4.2 AND 4.4 OF
THE THREE MILE ISLAND NUCLEAR STATION, UNIT 1, LICENSE RENEWAL
APPLICATION (TAC NO. MD7701)

Dear Mr. Gallagher:

By letter dated January 8, 2008, AmerGen Energy Company, LLC (AmerGen) submitted an application pursuant to 10 *Code of Federal Regulations* Part 54 (10 CFR Part 54) to renew the operating license for Three Mile Island Nuclear Station, Unit 1 for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Chris Wilson, of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-2878 or e-mail Jay.Robinson@nrc.gov.

Sincerely,

IRAI

Jay Robinson, Sr. Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosure:
As stated

cc w/encl: See next page

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Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosure:
As stated

cc w/encl: See next page

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ADAMS Accession No.: ML082170046

* = concurrence via e-mail

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DATE	08/06/08	05/20/08	08/14/08	08/07/08	08/18/08	08/20/08

OFFICIAL RECORD COPY

Letter to AmerGen Energy Company, LLC from J. Robinson dated August 20, 2008

DISTRIBUTION:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR SECTIONS 4.2 AND 4.4 OF
THE THREE MILE ISLAND NUCLEAR STATION, UNIT 1, LICENSE RENEWAL
APPLICATION (TAC NO. MD7701)

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Three Mile Island Nuclear Station,
Unit 1

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Three Mile Island Nuclear Station,
Unit 1

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Three Mile Island Nuclear Station,
Unit 1

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Mr. Michael P. Gallagher
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REQUEST FOR ADDITIONAL INFORMATION (RAI)

SECTIONS 4.2 & 4.4

THREE MILE ISLAND NUCLEAR STATION, UNIT – 1

LICENSE RENEWAL APPLICATION

Section 4.2 Neutron Embrittlement of the Reactor Vessel and Internals

RAI#: 4.2.0.0-01

LRA Section: 4.2

Background:

In Section 4.2, "Neutron Embrittlement of the Reactor Vessel and Internals," of your License Renewal Application (LRA), neutron embrittlement is discussed in several contexts relating to fracture toughness of the reactor vessel and internals, and the impact on fluence values used in the analysis of the Reference Temperature for Pressurized Thermal Shock (RT_{PTS}), Low-Temperature Over-Pressure Protection (LTOP), Pressure-Temperature (PT) limit curves, and the Charpy Upper Shelf Energy (USE).

Issue:

The submittal does not include a reference for the source of the fluence values used in the analysis of the RT_{PTS} , LTOP, PT limit curves, and the Charpy USE. The text mentioned the NRC Reactor Vessel Integrity Database, Revision 2 (RVID2), but these data do not constitute an acceptable reference for the current end of life (EOL) values. In addition, the submittal concerning this analysis refers to a nonexistent document: "a fluence analysis was prepared for TMI-1 that included a benchmark comparison to measured cavity dosimetry test results, and these projections were determined to meet the uncertainty requirements of Regulatory Guide 1.190, Revision 2."

Request:

- 1) Please submit the data mentioned above that was prepared for the EOL of extended operation for the staff to complete the review of Section 4.2.
- 2) Please note that Revision 2 for Regulatory Guide 1.190 does not exist. Please provide a corrected reference document.

ENCLOSURE

Section 4.4 Leak Before Break Analysis of Primary System Piping
Section 4.4.1 Fatigue Flaw Growth Analysis

RAI#: 4.4.1.0-01

LRA Section: 4.4.1

Background:

In Section 4.4.1, Fatigue Flaw Growth Analysis, the applicant states that it will use the metal fatigue of reactor coolant boundary aging management program (B.3.1.1) to monitor fatigue transient cycles and assure that the number of occurrences do not exceed design limits.

Issue:

It is not clear to the NRC staff exactly how the applicant will apply the metal fatigue aging management program (B.3.1.1) to monitor fatigue of the leak-before-break (LBB) piping.

Request:

- 1) Discuss how often the metal fatigue aging management program monitors fatigue transient cycles.
- 2) The applicant states that only significant thermal and pressure transients are monitored. Discuss the definition of a significant thermal or pressure transient and provide the associated technical basis.

RAI#: 4.4.1.0-02

LRA Section: 4.4.1

Background:

Recent industry experience has shown that Alloy 82/182 dissimilar metal welds are susceptible to primary water stress corrosion cracking (PWSCC). Industry and the NRC are currently working to resolve PWSCC in Alloy 82/182 welds with respect to the LBB analysis assumptions.

Issue:

Section 4.4.1, Fatigue Flaw Growth Analysis, has not addressed the issue of potential PWSCC of Alloy 82/182 welds with respect to the LBB analysis assumptions for those pipes that have been approved for LBB technology.

Request:

- 1) Identify LBB piping that contain Alloy 82/182 dissimilar metal welds and identify the welds.
- 2) Discuss the actions that will be taken to mitigate and/or inspect the Alloy 82/182 welds in the LBB piping to ensure that primary stress corrosion cracking will not affect the structural integrity of the LBB piping.
- 3) Discuss the validity of the original LBB analyses in light of industry experience in primary stress corrosion cracking of Alloy 82/182 butt welds.

RAI#: 4.4.1.0-03

LRA Section: 4.4.1

Background:

The NRC approved a 1.3% stretch power uprate for TMI-1 on July 28, 1988 (ADAMS ML003765237). The power uprate may change pressure and temperature of the primary coolant system which in turn may affect the structural integrity of the LBB piping.

Issue:

The applicant has not addressed the impact of the power uprate on the LBB piping and fatigue flaw growth analysis.

Request:

- 1) Discuss the impact of the operating conditions of power uprate on the LBB piping at the end of 60 years.

RAI#: 4.4.1.0-04

LRA Section: 4.4.1

Background:

In Section 4.4.1, Fatigue Flaw Growth Analysis, the applicant discussed the fatigue flaw growth aspect of the LBB application as part of the time-limited aging analysis (TLAA). However, the TLAA should also include a history of the structural integrity of the subject LBB piping.

Issue:

The inspection history of the LBB piping is not clear to the staff. The inspection history of the LBB piping will provide the NRC with an understanding of how the structural integrity of the LBB piping may be managed during the extended period of operation.

Request:

- 1) Discuss the inspection history of the piping systems that have been approved for LBB, including inspection results and frequency.

Section 4.4.2 Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Reactor Coolant Pump Casings

RAI#: 4.4.2.0-01

LRA Section: 4.4.2

Background:

In Section 4.4.2, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Reactor Coolant Pump Casings, page 4-45, fourth paragraph, the applicant discusses an updated flaw stability analysis in support of a generic leak-before-break analysis. On page 4-46, third paragraph, the applicant states that a flaw stability analysis was performed using the lower-bound CASS fracture toughness curves. On page 4-46, fourth paragraph, the applicant discusses a revised analysis. On page 4-46, fifth paragraph, the applicant states that "...Based on this analysis, it was determined that the TMI-1 RCP [reactor coolant pump] CASS components meet all safety margin requirements..."

Issue:

The number of analyses that are discussed in Section 4.4.2 and whether the analyses have been submitted to the NRC and whether or not the CASS components meet all safety margins is not clear to the NRC staff.

Request:

- 1) Clarify whether these analyses are the same analysis.
- 2) Provide the title and reference of the analyses, if they are individual analysis.
- 3) Submit the analyses that have not been submitted previously to the NRC.

RAI#: 4.4.2.0-02

LRA Section: 4.4.2

Background:

In Section 4.4.2, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Reactor Coolant Pump Casings, the applicant has not provided sufficient information regarding inspection of the reactor coolant pump (RCP) casing in general and CASS material in specific.

Issue:

The current ultrasonic testing (UT) technique has not been qualified through performance demonstration to thoroughly examine CASS material in accordance with the ASME Code, Section XI. Therefore, the NRC seeks information regarding the inspection of the CASS material and associated Alloy 82/182 weld (if exists).

Request:

- 1) Discuss how the RCP casing, which is made of CASS material, can be examined to determine its structural integrity.

- 2) Discuss the inspection history of the RCP casing, including results.
- 3) If the welds between the RCP nozzles and the pipe are fabricated with Alloy 82/182 filler metal, discuss the inspection of the welds, including inspection history, results, future inspection methods and frequency, and examination volume coverage.

RAI#: 4.4.2.0-03

LRA Section: 4.4.2

Background:

In Section 4.4.2, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Reactor Coolant Pump Casings, it is not clear to the NRC staff whether the applicant has addressed the staff position in CASS as specified in the letter below.

Issue:

By letter dated May 19, 2000, Christopher I. Grimes of the NRC forwarded Douglas J. Walters of Nuclear Energy Institute an evaluation of thermal aging embrittlement of CASS components (ADAMS Accession ML003717179). In the NRC's evaluation, the NRC staff provided its positions on how to manage CASS components.

Request:

Discuss how the CASS casing of the RCP satisfies the staff positions in its evaluation dated May 19, 2000.

RAI#: 4.4.2.0-04

LRA Section: 4.4.2

Background:

In Section 4.4.2, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Reactor Coolant Pump Casings, the applicant has not identified all CASS materials in the LBB piping.

Issue:

It is not clear how many components are made of CASS besides the RCP casing. The current ultrasonic testing has not been qualified through performance demonstration in accordance with the ASME Code, Section XI, Appendix VIII, to examine CASS materials. Therefore, the NRC needs to understand the extent of the CASS material in the subject LBB piping.

Request:

In addition to the RCP casing, identify any components in the piping systems approved for LBB that are made of CASS material.

RAI#: 4.4.2.0-05

LRA Section: 4.4.2

Background:

In Section 4.4.2, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS) Reactor Coolant Pump Casings, the applicant states that the lower-bound CASS material properties (e.g., fracture toughness) were used to show acceptability of CASS material for the period of extended operation.

Issue:

However, it is not clear in Section 4.4.2 whether the lower-bound CASS material properties are in fact bounding for the CASS material properties at the end of 60 years.

Request:

Please clarify.