AmerGen Energy Company, LLC
200 Exelon Way
Kennett Square, PA 19348

www.exeloncorp.com

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An Exelon Company

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United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Three Mile Island Nuclear Station, Unit 1
Facility Operating License No. DPR-50
NRC Docket No. 50-289

Subject: Three Mile Island Unit 1 Response to Request for Additional Information Related to the Results of the 2007 Steam Generator Tube Inspections

References:
(1) AmerGen Letter 5928-08-20013, Three Mile Island, Unit 1, "Cycle 17 Refueling (T1R17) Inservice Inspection (ISI) Summary Report," dated February 14, 2008

(2) Letter from P. Bamford (U. S. Nuclear Regulatory Commission) to C. Pardee (AmerGen Energy Company, LLC), "Three Mile Island Nuclear Power Station, Unit 1 - Request for Additional Information Regarding Review of Steam Generator Tube Inspection Report for the 2007 Outage (TAC No. MD8268)," dated November 12, 2008

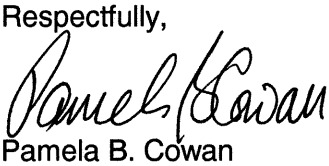
By letter dated February 14, 2008 (Reference 1), AmerGen Energy Company, LLC, (AmerGen) submitted information summarizing the results of the 2007 Steam Generator (SG) tube inspections at Three Mile Island, Unit 1. In order for the U. S. Nuclear Regulatory Commission (USNRC) staff to complete its review of the portions of the above-mentioned document pertaining to SG tube integrity, the USNRC staff requested additional information on November 12, 2008 (Reference 2).

The AmerGen responses to the USNRC questions are provided in the attachment to this letter.

There are no regulatory commitments contained in this submittal.

If you have any questions or require additional information, please contact Wendi Croft at (610) 765-5726.

Respectfully,



Pamela B. Cowan
Director - Licensing and Regulatory Affairs
AmerGen Energy Company, LLC

Attachment Three Mile Island Unit 1, Response to Request for Additional Information Related to the Results of the 2007 Steam Generator Tube Inspections

cc: Regional Administrator, USNRC Region I
Project Manager, NRR, USNRC – Three Mile Island, Unit 1
Senior Resident Inspector, USNRC – Three Mile Island
R. R. Janati, Commonwealth of Pennsylvania
File No. 02032

ATTACHMENT

Three Mile Island Unit 1

Response to Request for Additional Information Related to the Results of the 2007 Steam Generator Tube Inspections

Attachment
Three Mile Island Unit 1
Response to Request for Additional Information Related to the
Results of the 2007 Steam Generator Tube Inspections

NRC Question 1

Please confirm that all detected crack-like indications were plugged (except for those that were determined to be acceptable for service based on an NRC-approved alternate tube repair criteria).

TMI Unit 1 Response

All detected crack-like indications were plugged, except for those that were determined to be acceptable for service based on the site's NRC-approved kinetic expansion repair criteria.

NRC Question 2

It was indicated that the bobbin coil probe was used to inspect for tube-to-tube wear. Please discuss if any tube-to-tube wear was observed. If any was observed, discuss the size of these indications, how these indications were dispositioned, and the basis for leaving them in service (if applicable).

TMI Unit 1 Response

No steam generator (SG) tube-to-tube wear was observed during the TMI Unit 1 2007 Refueling Outage (T1R17) inspections.

NRC Question 3

Please discuss whether any degradation of your tube supports was detected. If so, discuss the extent and the basis for dispositioning this degradation.

TMI Unit 1 Response

No degradation of SG tube supports was detected during the T1R17 inspections.

NRC Question 4

Please discuss the results of your visual and eddy current inspection of the plugs (including the thimble plugs).

TMI Unit 1 Response

Visual examinations were conducted on all plugged tubes, including tubes with thimble plugs. No plug leakage or plug movement was detected.

One third of the thimble plugs, which are located only in the lower tubesheet (i.e., cold leg) of the 'A' SG, were examined using PlusPoint eddy current probes. No degradation was detected.

One third of the plant's upper tubesheet (i.e., hot leg) Westinghouse rolled plugs, which are also located only in the 'A' SG, were examined using PlusPoint eddy current probes. No degradation was detected.

Attachment
Three Mile Island Unit 1
Response to Request for Additional Information Related to the
Results of the 2007 Steam Generator Tube Inspections

NRC Question 5

Please discuss whether any of the volumetric intergranular attack indications were excluded from your growth analysis because they were outliers. If any data were excluded, please discuss the number of data points excluded and the growth rate for these data points. In addition, please discuss how the 2007 results compare to prior outages.

TMI Unit 1 Response

No volumetric inner diameter (ID) intergranular attack (IGA) indications were excluded from the required statistical growth analysis tests because they were outliers. In cases where the initial tests identified indications as potential outliers, a Level III Data Analyst reviewed the current and previous data. In the final analysis, none of these indications were excluded from the statistical tests.

The 2007 results for volumetric ID IGA indication population and growth were consistent with prior outages. The statistical tests, required by the plant's NRC-approved repair criteria, continued to support a no growth conclusion, similar to prior outages. Table 6-1 of the Outage Report (Reference 1) provides a comparison of the T1R17 results to the TMI Unit 1 2005 Refueling Outage (T1R16) results. Previous outage reports for Outages T1R16, TMI Unit 1 2003 Refueling Outage (T1R15), and TMI Unit 1 2001 Refueling Outage (T1R14) have also supported a no-growth conclusion based on the required statistical tests. (The Volumetric ID IGA indications were caused by a one-time sulfur intrusion in the early 1980's.)

NRC Question 6

On page 15 of Enclosure 1 to your February 14, 2008 letter, you indicated that 13,819 inservice tubes in steam generator A and 14,607 inservice tubes in steam generator B were repaired by kinetic expansion. These numbers do not match those on page 18 or Table 2-1. Please clarify.

TMI Unit 1 Response

Table 2-1 and page 18, of Reference 1, provide a summary of the examinations performed on in-service tubes, plugs and sleeves, prior to completing the repairs during T1R17. By contrast, page 15 provides summary numbers for repaired tubes that are currently in-service, following the completion of all repairs performed during T1R17.

The kinetic expansion process repaired all in-service tubes in the 1980's. In 1991 and 1993, additional tubes were repaired using Inconel 690 sleeves. Therefore, 247 tubes in the 'A' SG and 252 tubes in 'B' SG have been repaired by both the kinetic expansion process and Inconel 690 sleeves and remain in-service. Since the Inconel 690 sleeves span the kinetic expansion areas, tubes that have both kinetic expansions and sleeves are examined as part of the sleeved tube population using probes and techniques designed for sleeved tubes.

The following table summarizes the derivation of the subject values:

	'A' SG	'B' SG
In-service Tubes (Prior to T1R17)	13,870	14,660
In-service Tubes (Repaired with Kinetic Expansions Prior to T1R17)	13,870	14,660
Kinetic Expansion Examination Scope for T1R17	13,623	14,408
Sleeve Examination Scope for T1R17	247	252
In-service Tubes Plugged during T1R17	51	53
In-service Tubes (Following T1R17)	13,819	14,607

NRC Question 7

Other than postulated leakage from flaws in the kinetically expanded region of the tubing, please discuss the source and nature of any other sources of primary-to-secondary leakage that were detected during the 2007 outage.

TMI Unit 1 Response

No actual sources of primary-to-secondary leakage were detected during T1R17.

For the purpose of evaluating postulated accident-induced primary-to-secondary leakage, the TMI Unit 1 SG's Framatome/AREVA rolled tube plugs, Westinghouse rolled tube plugs, and sleeves are postulated to be leak-limiting, vice leak free. Postulated leakage from volumetric ID IGA indications was evaluated in accordance with the plant's approved criteria. Postulated leakage from other flaw indications detected were evaluated in accordance with the Electric Power Research Institute's "Steam Generator Integrity Assessment Guidelines."

NRC Question 8

Please discuss whether any indications were detected at dented locations. If so, please discuss the nature and size of the indication and the size of the dent. If any indications were found in dents whose voltage was near the threshold value for performing rotating probe examinations, please provide the basis for why no sample expansion was necessary.

TMI Unit 1 Response

There was no degradation detected adjacent to dented locations. Dent signals were examined with Motorized Rotating Probe Coils (MRPC) during T1R17 as described in Section 2.2.5 of the Reference 1 report.

NRC Question 9

During the 2005 outage, approximately 1200 inside diameter intergranular attack indications were detected in steam generator A. During the 2007 inspection, only 1119 indications were used in the growth assessment. Please discuss this apparent discrepancy in the number of data points (e.g., were some indications not detected during the 2007 outage?).

TMI Unit 1 Response

Some of the T1R16 indications were not detected during T1R17. The volumetric ID IGA indications in the TMI Unit 1 SGs are very small, and detection of some of these indications may or may not occur during a given outage. In order to be utilized in the growth assessment analyses, these small volumetric ID IGA indication signals must be detected in two consecutive outages, and must be identified at comparable axial locations in the tubing.

In some cases, the MRPC probes may traverse through the affected area in a manner that does not produce a detectable eddy current indication. In other cases, the orientation of the coil and the suspected IGA may not produce a signal that meets the recording criteria. Both of these conditions are due in part to the fact that there is no lower threshold for recording indications, and threshold level indications are not always repeatable.

This phenomenon was described in the site's TS Section 6.19.c.a referenced Engineering Change Request (ECR) TM 01-00328 (Reference 2). The following excerpt is from the ECR:

> "...The ID IGA indications overall tend to be low in voltage and part through wall."

In addition, there were some small ID Volumetric IGA indications that were "first-seen by MRPC" in T1R16, and whose length of tubing was examined using the bobbin coil probe and not the MRPC probe during T1R17. If the T1R16 ID IGA indication was below the threshold for MRPC re-examination during T1R17 (based on the voltage, axial extent and circumferential extent degraded criteria) that area would have been examined by bobbin probe and not MRPC during T1R17. Since there was no T1R17 MRPC data for these small T1R16 indications they were not utilized in the statistical analyses of T1R16-to-T1R17 growth. For example, a small ID IGA indication identified during T1R16 may have been detected by MRPC at a location examined for some other reason during the outage.

Bobbin examinations are performed on 100% of the unexpanded tubing, and a technical basis of TMI Unit 1's management program for ID IGA is that the bobbin coil probe is able to detect the significant ID IGA indications. Reference 2 provides the criteria for determining which indications must be examined with MRPC during subsequent examinations.

Note that, while many of the ID IGA indications are difficult to detect, the number of indications used in the growth analyses in the 'A' SG has increased with each successive outage. The number of volumetric ID IGA used in the T1R17 circumferential extent growth assessment (i.e., 1119 indications between T1R17 and T1R16) was greater than that used in the prior T1R16 outage (i.e., 832 indications between T1R16 and T1R15). As the amount of MRPC examinations in the TMI Unit 1 SGs has increased each outage, the number of small ID IGA indications that are detected by the MRPC probes, and are subsequently utilized in the MRPC coil circumferential extent growth assessments, has also increased. Plugging has removed some of the ID IGA indications from service, but additional MRPC examinations have resulted in additional indications for mathematical outage-to-outage growth comparison. In summary, the probability of detection, plugging, and MRPC scope have influenced the numbers of indications available for statistical comparison.

NRC Question 10

Please discuss whether any indications were detected in the sleeves or in the lower tubesheet crevice. If any indications were detected, please discuss the nature of the indications.

TMI Unit 1 Response

No sleeve indications were detected. No outer diameter initiated indications were detected in the lower tubesheet crevice examinations.

Reference

1. AmerGen Letter 5928-08-20013 dated February 14, 2008, Enclosure 1, Tab 2, "Report on the 2007 Outage T1R17 Eddy Current Examinations of the TMI-1 OTSG Tubing."

2. AmerGen ECR TM 01-00328 dated October 06, 2001, "Management Program for OTSG Volumetric ID IGA Indications."