AmerGen Energy Company, LLC
200 Exelon Way
Kennett Square, PA 19348
www.exeloncorp.com

AmerGen SM
An Exelon Company

10 CFR 50.54(f)

June 17, 2005
5928-05-20139

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Three Mile Island, Unit 1 (TMI Unit 1)
Facility Operating License No. DPR-50
NRC Docket No. 50-289

Subject: Response To Request For Additional Information – TMI Unit 1 Response to NRC Generic Letter (GL) 2004-01, "Requirements for Steam Generator Tube Inspections," dated August 30, 2004 (TAC NO. MC4859)

Reference: NRC letter from T. G. Colburn to C. M. Crane, dated May 9, 2005, Request for Additional Information (RAI) Re: Three Mile Island Nuclear Station, Unit 1 (TMI-1) Response to Generic Letter (GL) 2004-01, "Requirements for Steam Generator Tube Inspection," dated August 30, 2004 (TAC No. MC4859)

This letter provides the response to the NRC request for additional information (Reference 1) regarding TMI Unit 1 response to NRC GL 2004-01, "Requirements for Steam Generator Tube Inspections," submitted to NRC on October 29, 2004. The additional information is provided in Enclosure 1.

No new regulatory commitments are established by this submittal. If any additional information is needed, please contact David J. Distel at (610) 765-5517.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

6/17/05
Executed On

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

Enclosure: Response to Request for Additional Information

cc: S. J. Collins, USNRC Administrator, Region I
T. G. Colburn, USNRC Senior Project Manager, TMI Unit 1
D. M. Kern, USNRC Senior Resident Inspector, TMI Unit 1
File No. 04111

ENCLOSURE

TMI UNIT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

RESPONSE TO NRC GENERIC LETTER (GL) 2004-01, "REQUIREMENTS FOR STEAM GENERATOR TUBE INSPECTIONS," DATED AUGUST 30, 2004

1. **NRC Question**

The October 29, 2004, response to GL 2004-01 indicated that the TMI-1 steam generator (SG) tube inspection approach/methods are consistent with the NRC staff's position provided in the GL. In Table 1, Note 6, you state that examination results from other once-through SG plants in the lower tubesheet sludge pile region have indicated that bobbin coil detection capability may be reduced in this region. You further state that there is no evidence to date, that TMI-1 is experiencing a reduction in the bobbin coil probability of detection (POD) in this region. Please provide the basis for this statement considering that licensees for other plants with similarly designed SGs have stated that tubes in the kidney region require the use of a rotating pancake coil probe for better detection of intergranular attack (IGA) due to sludge build up in the upper portion of the lower tubesheet crevice. In addition, for each indication within the sludge pile and in other areas of the lower tubesheet (excluding tube end cracking), provide a summary that includes the indications's location, the nature of the indication (IGA, stress-corrosion cracking (SCC), etc.), the indication's severity (length and depth), and whether the indication was detected by bobbin coil inspection, rotating pancake coil probe inspection, or both. Discuss whether rotating pancake coil probe inspections detected indications that were not detected by the bobbin coil probe, and if so, the implications of this finding. Discuss if the bobbin coil technique used in the lower tubesheet region meets the industry standards (e.g., Appendix H of the Electric Power Research Institute "Pressurized-Water Reactor Steam Generator Examination Guidelines: Revision 6," ADAMS Accession No. ML050980251). If this technique does not meet the industry standards, discuss your future plans for qualifying the inspection technique. If this technique does not meet industry standards and you have no plans to qualify the technique to an industry standard, provide the acceptance standard, specification or criteria you are using and the technical basis for this standard, specification, or criteria to ensure the adequacy of this technique.

Response

The TMI-1 GL 2004-01 response, which stated that TMI-1 has found no evidence to date that TMI-1 is experiencing a reduction in the bobbin coil detection capability in this region, is based on the large number of supplemental examinations performed by TMI-1 to discern whether indications are present in the lower tubesheet sludge pile regions that are detected by +Point probes and not detected by bobbin coil probes. To date, these supplemental examinations have not found indications detected by +Point probes that were not already identified as requiring follow-up +Point probe examination by the bobbin coil probe, or any evidence of a reduction in bobbin coil probe detection capability. A statistically significant population of tubes has been sampled during the supplemental examinations: approximately 4000 supplemental examinations have been performed over the last three (3) plant refueling outages.

Table 1 below provides a summary of the examination history and examination results for the TMI-1 lower tubesheet (LTS) regions, excluding the lower tube end roll expansion regions, starting with the 1997 refueling outage 12R. This outage was chosen as a starting point for the table because:

1. It was the first refueling outage where 100% of the in-service tubes were scheduled for bobbin coil examination.
2. It was the first outage where a significant population of bobbin coil indications in the LTS region was examined by +Point probes.
3. Review of prior outage reports since the 1986 plant restart indicates that the first service induced degradation in the lower tubesheet region was identified during the 1997 refueling outage inspection.

The TMI-1 OTSG kidney regions are defined as the regions of the lower tubesheets that bound lower tubesheet secondary face dents. These regions generally encompass the deepest sludge pile areas. A significant population of tubes, as described in Table 1, was first scheduled for +Point probe examination to supplement the bobbin examinations in the lower tubesheet kidney regions in 1999 as a result of examination findings at another Once-Through Steam Generator (OTSG) plant. These +Point probe examinations were performed in tubes irrespective of their bobbin probe examination results (i.e., these +Point probe examinations were not only performed at the location of bobbin coil probe indications).

As can be noted in Table 1, since 1997 TMI-1 has plugged several tubes due to indications near the lower tubesheet secondary face (essentially at the secondary face) or above, and all of these indications were at locations where follow-up +Point probe examinations were required based on bobbin coil probe examination results. To date, at TMI-1, additional +Point probe examinations in the tubesheet sludge and crevice regions have not identified degradation that was not initially identified by the bobbin coil probe as requiring follow-up +Point probe examinations. These findings indicate that, to date, the bobbin coil probe detection capability is adequate and is considered equivalent to the bobbin coil probe detection capability expected in unexpanded tubing elsewhere in the TMI-1 steam generators.

The bobbin coil probe examination technique qualification data set for the OTSG crevice region includes data from the upper tubesheet and does not meet all of the Electric Power Research Institute "Pressurized-Water Reactor Steam Generator Examination Guidelines: Revision 6," Appendix H requirements for the lower tubesheet. The bobbin coil probe examination technique continues to be applicable to the TMI-1 lower tubesheet crevice regions because:

1. The ECT essential variables in the lower tubesheet region are similar to the Appendix H bobbin coil probe qualification (based on site validation review in accordance with the EPRI Steam Generator Examination Guidelines.)
2. The inspection findings, to date, validate that the bobbin coil probe is performing acceptably based on the targeted +Point probe examinations in the LTS region.
3. Future TMI-1 examination scopes will continue to include targeted lower tubesheet +Point probe examinations to evaluate bobbin coil probe detection sensitivity. The +Point probe examination provides an additional examination

meeting the requirements of the EPRI Steam Generator Examination Guidelines for the detection of degradation within the tubesheet crevice or sludge pile.

TMI-1 does not currently plan to revise the bobbin coil probe qualification specifically for the lower tubesheet crevice or sludge pile regions. TMI-1 will continue to apply defense in depth by examining a supplemental sample of tubes in the defined kidney region with +Point probes to address the possible future decrease of the bobbin coil probe probability of detection. TMI-1 will continue to examine dents with +Point probes in accordance with the EPRI Steam Generator Examination Guidelines. (Initial samples include approximately 33% of the bobbin coil recorded dents and 33% of the kidney region tubes at the LTS faces.) If degradation in the lower tubesheet region at TMI-1 is identified that indicates the bobbin coil probe probability of detection may be reduced, or that degradation exists at recorded dents, then additional examinations (i.e., +Point probe examination scope expansion) will be performed in accordance with the EPRI Examination Guidelines. These supplemental +Point probe examinations, and associated +Point probe examination scope increases required by the Guidelines, are a plant requirement beyond that which the plant would have if it relied only on the bobbin probe.

It is noted that based on the question's exclusion of the tube end cracking, this response does not discuss lower tubesheet region degradation associated with lower tube end expansion region indications. This response also does not address the TMI-1-specific Inside Diameter (ID)-initiated degradation (from a 1981 sodium thiosulfate intrusion) since detection and disposition of this ID-initiated degradation are essentially unaffected by the presence of secondary side sludge. This response has addressed all other degradation associated with the TMI-1 lower tubesheets (i.e., the lower tubesheet open crevice) and the "top of the tubesheet" regions (i.e., the lower tubesheet sludge pile region).

Table 1
Summary of TMI-1 Outage Examination Scope and Lower Tubesheet Degradation Detected Since 1997
(Excluding Lower Tube Expansion Examinations)

Outage Year	Steam Generator	Bobbin Coil Examination Scope	+Point Examination Scope[3]	Degradation Detected[1,2]
1997	OTSG-A	100% of all in service tubes.	Special interest only in 96 tubes (bobbin coil probe indications of possible degradation and lower tubesheet dents ≥16 volts were examined with the +Point probe).	**Tube 33-54** – One volumetric OD IGA indication was detected 0.77" above the LTSF. The indication was recorded as a 0.86 Volt bobbin coil probe NQI signal that required follow-up +Point probe examination. +Point probe examination of this bobbin coil probe indication resulted in a 0.25 Volt SVI indication measured as 0.19" axial extent by 0.28" circumferential extent and 68% through wall. This tube was plugged. **Tube 67-70** – One volumetric OD IGA indication was detected 0.17" below the LTSF. The indication was recorded as a 23.4 Volt bobbin coil probe dent that required follow-up +Point probe examination. +Point probe examination of this bobbin coil probe indication resulted in a 0.24 Volt SVI indication measured as 0.21" axial extent by 0.29" circumferential extent and 80% through wall. This tube was plugged.

[1] Note that the 1997 voltage values in this table have been corrected to reflect the current EPRI Steam Generator Examination Guidelines, Revision 6, voltage normalization values. TMI-1 changed its voltage normalization value to match that of these Guidelines after its 1997 outage.
[2] Note that not all of the Table 1 +Point Probe throughwall estimates and extents were recorded by the eddy current analysts during the 1997-2003 outages. Some of the throughwall estimates and extents were determined in May 2005 to respond to the subject RAI.
[3] "Bobbin coil indications of possible degradation" are prescribed by the plant's Eddy Current Analysis Guidelines.

Outage Year	Steam Generator	Bobbin Coil Examination Scope	+Point Examination Scope[3]	Degradation Detected[1,2]
	OTSG-B	100% of all in service tubes.	Special interest only in 204 tubes (follow-up examination of bobbin coil probe indications of possible degradation and lower tubesheet dents ≥16 volts were examined with the +Point probe).	**Tube 92-84** – One OD axial indication was detected 1.56" above the LTSF. The indication was recorded as a 1.85 Volt bobbin coil probe NQI indication that required follow-up +Point probe examination. +Point probe examination of this bobbin coil probe indication resulted in a 1.22 Volt SAI indication measured as 0.24" in axial length and 41% through wall. This tube was plugged.
1999	OTSG-A	100% of all in service tubes.	Supplemental examination of 510 tubes in the kidney region in order to validate bobbin coil probe detection capability. Special interest examination in 150 tubes (follow-up examination of bobbin coil probe indications of possible degradation and lower tubesheet dents ≥16 volts).	**Tube 38-74** – One volumetric OD IGA indication was detected 2.01" above the LTSF. The indication was recorded as a 0.48 Volt bobbin coil probe NQI indication that required follow-up +Point probe examination. +Point probe examination of this bobbin coil probe indication resulted in a 0.52 Volt SVI indication measured as 0.12" axial extent by 0.15" circumferential extent and 76% through wall. This tube was plugged. No additional degradation was found during the supplemental +Point probe examinations.
	OTSG-B	100% of all in service tubes.	Supplemental examination of 516 tubes in the kidney region in order to validate bobbin coil probe detection capability. Special interest examination in 191 tubes (follow-up examination of bobbin coil indications of possible degradation and lower tubesheet dents ≥16 volts).	No degradation was detected in the inspected lengths of the crevice or sludge pile regions. No additional degradation was found during the supplemental +Point probe examinations.

Outage Year	Steam Generator	Bobbin Coil Examination Scope	+Point Examination Scope[3]	Degradation Detected[1,2]
2001	OTSG-A	100% of all in service tubes	Supplemental examination of 625 tubes in the kidney region in order to validate bobbin coil probe detection capability. Special interest examination in 52 tubes (follow-up examination of bobbin coil probe indications of possible degradation and lower tubesheet dents ≥16 volts located outside the defined kidney examination region).	No degradation was detected in the inspected lengths of the crevice or sludge pile regions. No additional degradation was found during the supplemental +Point probe examinations.
	OTSG-B	100% of all in service tubes	Supplemental examination of 827 tubes in the kidney region in order to validate bobbin coil probe detection capability. Special interest examination in 19 tubes (follow-up examination of bobbin coil probe indications of possible degradation and lower tubesheet dents ≥16 volts located outside the defined kidney examination region).	**Tube 28-42** – One volumetric OD IGA indication was detected 1.62" above the LTSF. The indication was recorded as a 0.53 Volt bobbin coil probe NQI signal that required follow-up +Point probe examination. +Point probe examination of this bobbin coil probe indication resulted in a 0.22 Volt SVI indication measured as 0.14" axial extent by 0.23" circumferential extent and 55% through wall. This tube was plugged. No additional degradation was found during the supplemental +Point probe examinations.

Outage Year	Steam Generator	Bobbin Coil Examination Scope	+Point Examination Scope[3]	Degradation Detected[1,2]
2003	OTSG-A	100% of all in service tubes	Supplemental examination of 611 tubes in the kidney region in order to validate bobbin coil probe detection capability. Special interest examination in 188 tubes (follow-up examination of bobbin coil probe indications of possible degradation and 33% of dents at the LTS secondary face and below located outside the defined kidney examination region).	**Tube 55-105 -** One OD IGA indication was detected 1.05" above the LTSF. The indication was recorded as a 0.36 Volt bobbin coil probe NQI signal that required follow-up +Point probe examination. +Point probe examination resulted in a 0.33 Volt SVI indication measured as 0.15" axial extent by 0.26" circumferential extent and 21% through wall. This tube was plugged. No additional degradation was found during the supplemental +Point probe examinations.
	OTSG-B	100% of all in service tubes	Supplemental examination of 889 tubes in the kidney region in order to validate bobbin coil detection capability. Special interest examination in 91 tubes (follow-up examination of bobbin coil probe indications of possible degradation and 33% of dents at the LTS secondary face and below located outside the defined kidney examination region).	No degradation was detected in the inspected lengths of the crevice or sludge pile regions. No additional degradation was found during the supplemental +Point probe examinations.

Table of Acronyms

LTSF = Lower Tubesheet Secondary Face
NQI = Non-Quantifiable Indication
OD IGA = Outside Diameter-initiated InterGranular Attack
OTSG = Once-Through Steam Generator
SAI = Single Axial Indication
SCC = Stress Corrosion Crack or Stress Corrosion Cracking
SVI = Single Volumetric Indication

2. **NRC Question**

If as a result of your response to the questions above, you conclude that full compliance with the TMI-1 Technical Specifications in conjunction with Criteria IX, XI, and XVI of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix B, requires corrective actions, please discuss your proposed corrective actions as requested by GL 2004-01, Requested Information #2. In addition, if the inspections are not being performed consistent with the NRC position on the requirements, please submit a safety assessment as requested in GL 2004-01, Requested Information #3.

Response

Based on the response to Question 1, above, TMI-1 is in full compliance with its Technical Specifications in conjunction with 10 CFR 50, Appendix B Criteria, and has determined that no corrective actions or safety assessment are required.