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September 19, 2008

U. S. Nuclear Regulatory Commission

ATTN: Document Control Desk

Washington, DC 20555

Three Mile Island Nuclear Station, Unit 1.

Facility Operating License No. DPR-50

NRC Docket No.50-289

**Subject:** Response to NRC Request for Additional Information related to Three Mile Island Nuclear Station, Unit 1, License Renewal Application

**Reference:** Letter from Mr. Jay Robinson (USNRC), to Mr. Michael P. Gallagher (AmerGen) "Request for additional information for Sections 2.2, 2.3, 2.4, & 2.5 of the Three Mile Island Nuclear Station, Unit 1, License Renewal Application", dated August 22<sup>th</sup>, 2008. (TAC No. MD7701)

In the referenced letter, the NRC requested additional information related to Sections 2.2, 2.3, 2.4, and 2.5 of the Three Mile Island Nuclear Station, Unit 1, License Renewal Application (LRA). Enclosed are the responses to this request for additional information.

This letter and its enclosure contain no commitments.

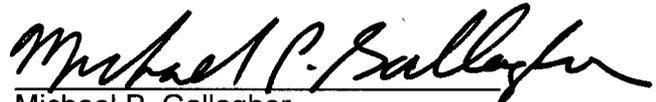
If you have any questions, please contact Fred Polaski, Manager License Renewal, at 610-765-5935.

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

Respectfully,

Executed on

09-19-2008



Michael P. Gallagher  
Vice President, License Renewal  
AmerGen Energy Company, LLC

A131  
NRC

September 17, 2008

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Enclosure A: Response to Request for Additional Information for Sections 2.2, 2.3, 2.4, and 2.5 of the Three Mile Island Nuclear Station, Unit 1, License Renewal Application.

cc: Regional Administrator, USNRC Region I, w/Enclosure  
USNRC Project Manager, NRR - License Renewal, Safety, w/Enclosure  
USNRC Project Manager, NRR - License Renewal, Environmental, w/o Enclosure  
USNRC Project Manager, NRR - TMIGS, w/o Enclosure  
USNRC Senior Resident Inspector, TMIGS, w/o Enclosure

File No. 08001

## Enclosure – A

Response to Request for Additional Information for Sections 2.2, 2.3, 2.4, and 2.5 of the Three Mile Island Nuclear Station, Unit 1, License Renewal Application.

Note: As a standard convention for AmerGen RAI responses, added text will be shown as ***bolded italics*** whereas deleted text will be shown as ~~strikethrough~~.

**RAI # 2.2-1**

Table 2.2-1, Plant Level Scoping Results, lists the Chemical Cleaning Building as NOT being within the scope of license renewal. However, the TMI UFSAR, Section 5.1.1.1.a, lists the Chem Cleaning Building *Basin* as a Class I structure. If it is not included as an oversight, please provide a description of the scoping and aging management review. If it is covered somewhere else in the LRA, please indicate the location, or provide the basis for its exclusion from the scope of license renewal.

**AmerGen Response**

The Chemical Cleaning Building is excluded from the scope of License Renewal because this building does not meet any of the scoping criteria per 10CFR54.4 (a)(1), (a)(2), or (a)(3). Specifically, this building is not safety-related, the building does not contain any safety-related SSCs, failure of this building will not affect any intended functions for safety-related SSCs and it is not relied on to demonstrate compliance with any of the 5 regulated events identified per 10 CFR 54.4 (a)(3).

As stated per Section 11.2.1 of the TMI-1 UFSAR, “Radioactive liquid waste disposal equipment and piping systems are all housed within structures that are designed in accordance with seismic Category I...”

Also, as stated per the LRA Table 2.2-1, “The equipment in the building is used to support the processing of TMI-1’s low level liquid radioactive waste. The tanks inside the building are used to collect, pretreat and store liquid waste from the Auxiliary Building.”

Therefore the Chemical Cleaning Building Basin is a Class I structure as indicated per TMI UFSAR, Section 5.1.1.1.a only because it is used to support the processing of TMI-1’s low level liquid radioactive waste.

**RAI # 2.3.3.10-1**

LRA Tables 2.3.3-10 and 3.3.2-10 exclude several types of fire protection components that are discussed in the Safety Evaluation Reports (SERs) and/or UFSAR. These components are listed below:

- hose connections
- hose racks
- yard hose houses
- interior fire hose stations
- pipe supports
- buried piping
- filter housing
- flexible hose
- dikes for oil spill confinement
- buried underground fuel oil tanks for emergency diesel generators
- fire water main loop valves
- post indicator valves
- lubricating oil collection system components for each reactor coolant pump
- lubricating oil cooler
- auxiliary lubricating oil makeup tank
- floor drains and curbs for fire-fighting water
- backflow prevention devices
- flame retardant coating for cables
- fire retardant coating for structural steel supporting walls and ceilings
- thermal insulation on valves
- engine intake and exhaust silencers/muffler (diesel driven fire pump)
- heat exchanger (bonnet)
- heat exchangers (shell)
- heat exchangers (tube)

For each, determine whether the component should be included in Tables 2.3.3.10 and 3.3.2-10, and, if not, justify the exclusion.

**AmerGen Response**

Hose connections – Hose connections are included in the “Piping and fittings” component category in LRA Tables 2.3.3-10 and 3.3.2-10.

Hose racks – Hose rack stations include valves, couplings, and fittings that are included in the “Valve Body” and “Piping and fittings” component categories in LRA Tables 2.3.3-10 and 3.3.2-10. Although pressure tested in accordance with NUREG-1801 program requirements, the linen fire hose is considered consumable and is not subject to aging management review.

Yard hose houses – Yard hose houses are nonsafety-related structures not credited with aging management of fire protection components for TMI-1 license renewal and are not subject to aging management review.

Interior fire hose stations – Hose stations include valves, couplings, and fittings that are included in the “Valve Body” and “Piping and fittings” component categories in LRA Tables 2.3.3-10 and

3.3.2-10. Although pressure tested in accordance with NUREG-1801 program requirements, the linen fire hose is considered consumable and is not subject to aging management review.

Pipe supports – Pipe supports are included under the component type of “Support members; welds; bolted connections; support anchorage to building structure” in the “Component Supports Commodity Group” in LRA Table 2.4-17.

Buried piping – Buried fire protection piping is included in the “Piping and fittings” component category in LRA Tables 2.3.3-10 and 3.3.2-10, with an environment of “Soil (External)” in LRA Table 3.3.2-10.

Filter housing – Filter housings are included in the component category of “Strainer Body” in LRA Tables 2.3.3-10 and 3.3.2-10.

Flexible hose – The only (non-fire water) flexible hoses in the TMI Fire Protection System are part of the fire detection system and are included in the “Piping and fittings” component category in LRA Tables 2.3.3-10 and 3.3.2-10, with a material of “Polymer” in LRA Table 3.3.2-10. Fire water hoses are considered consumable and are not subject to aging management review.

Dikes for oil spill confinement – Dikes for oil spill confinement are included in the component category of “Concrete Curbs” in LRA Tables 2.3.3-10 and 3.3.2-10, with an intended function of “Fire Barrier (Contain oil spills).”

Buried underground fuel oil tanks for emergency diesel generators – The buried 30,000 gallon fuel oil tank for the emergency diesel generators is evaluated under the Emergency Diesel Generators and Auxiliary Systems in LRA Table 2.3.3-9. The diesel fuel storage tanks for the diesel-driven fire pumps are above-ground tanks, evaluated with the Fuel Oil System in LRA Table 2.3.3-12.

Fire water main loop valves – Fire water system valves are included in the “Valve Body” component type in LRA Tables 2.3.3-10 and 3.3.2-10.

Post indicator valves – Fire water system valves are included in the “Valve Body” component type in LRA Tables 2.3.3-10 and 3.3.2-10.

Lubricating oil collection system components for each reactor coolant pump – These components are found under the “Piping and fittings,” “Drip Pan,” “Valve Body,” and “Tanks (RC Pump lube oil drain tanks)” component categories in LRA Tables 2.3.3-10 and 3.3.2-10.

Lubricating oil cooler – This component is considered an integral subcomponent part of the Fire Pump Diesel Engine which is considered an active component in accordance with NUREG-1800, Revision 1 Table 2.1-5, Item No. 55 and is not subject to aging management review.

Auxiliary lubricating oil makeup tank – The TMI-1 Fire Protection System does not have auxiliary lubricating oil makeup tanks. The diesel engines for the fire pumps have oil sump pans that are integral subcomponents of the Fire Pump Diesel Engines which are considered active components in accordance with NUREG-1800 Revision 1 Table 2.1-5, Item No. 55 and are not subject to aging management review.

Floor drains and curbs for fire-fighting water – Floor drains are evaluated with the Miscellaneous Floor and Equipment Drains System in LRA Table 2.3.3-18. Concrete curbing for flood control is included with the Dike/Flood Control System in LRA Table 2.4-6.

Backflow prevention devices – These components are included in the “Valve Body” component type in LRA Tables 2.3.3-10 and 3.3.2-10.

Flame retardant coating for cables – Thermo-Lag and Mecatiss Firewrap systems are evaluated under the component type “Fire Barriers (Fire Rated Enclosures)” in LRA Tables 2.3.3-10 and 3.3.2-10.

Fire retardant coating for structural steel supporting walls and ceilings – These items are evaluated as insulation under “Structural Commodities” in LRA Table 2.4-13.

Thermal insulation on valves – Thermal insulation is evaluated under “Structural Commodities” in LRA Table 2.4-13.

Engine intake and exhaust silencers/muffler (diesel driven fire pump) – These components are considered integral subcomponent parts of the Fire Pump Diesel Engines which are considered active components in accordance with NUREG-1800, Revision 1 Table 2.1-5, Item No. 55 and are not subject to aging management review.

Heat exchanger (bonnet, shell, and tube) – These components are considered integral subcomponent parts of the Fire Pump Diesel Engines which are considered active components in accordance with NUREG-1800, Revision 1 Table 2.1-5, Item No. 55 and are not subject to aging management review.

**RAI # 2.4.0-1**

To clarify the component identified as "Steel Components: All Structural Steel" in various LRA Tables 2.4-XX, please confirm that the connection components (e.g. gusset plates, welds, etc.) are in-scope for license renewal and subject to an AMR.

**AmerGen Response**

Connection components (e.g., gusset plates, welds, etc.) are included in scope for license renewal and subject to an AMR. These items are included for the component identified as "Steel Components: All Structural Steel" as indicated in the various LRA Tables, 2.4.-XX.

Connection components (e.g., gusset plates, welds, etc.) associated with a component support are included in scope for license renewal for the component identified as "Support members; welds; bolted connections; support anchorage to building structure" as indicated in Table 2.4.-17.

**RAI # 2.4.2-1**

Section 2.6.5.d.4 of the TMI UFSAR states,

“Flood Gate (TMI-FG-B1) at 306 foot floor elevation between Aux Building and Turbine Building areas.”

Table 2.4-2 for the Auxiliary Building Components Subject to Aging Management Review does not list Flood Gate specifically in any row. If it is not included as an oversight, please provide a description of the scoping and aging management review. If it is covered somewhere else in the LRA, please indicate the location. If it is excluded from the scope of license renewal, please provide the basis for the exclusion.

**AmerGen Response**

Flood Gates associated with the Auxiliary Building are in scope for License Renewal and are included in Table 2.4-2 and Table 3.5.2-2 for the component identified as "Bulkhead".

The component name "Bulkhead" is used in the LRA for this component because it more accurately describes the item as a full height flood barrier permanently mounted at the location where it is required to perform its intended function. This is similar to a bulkhead on a ship or submarine.

**RAI # 2.4.4-1**

Section 2.6.5.c of the TMI UFSAR states,

“Flood Gate (TMI-FG-B2) at 306 foot floor elevation between Turbine Building and Control Building areas.”

Table 2.4-4 for the Control Building Components Subject to Aging Management Review does not list Flood Gate specifically in any row. If it is not included as an oversight, please provide a description of the scoping and aging management review. If it is covered somewhere else in the LRA, please indicate the location. If it is excluded from the scope of license renewal, please provide the basis for the exclusion.

**AmerGen Response**

Flood Gates associated with the Control Building are included in Table 2.4-4 for the component identified as "Metal components: All structural members" to align with an appropriate component name in NUREG 1801. These items are staged near the locations where they are required to be installed in the event of a flood. In addition, these flood gates are high enough to protect the associated structure from the design basis flood; however, they do not encompass the entire vertical opening in the structure.

**RAI # 2.4.5-1**

Section 2.6.5.f.1 of the TMI UFSAR states,

1. "Flood Gates (TMI-FG-D1/D2A/D2B/D3) at 305 foot floor elevation."

Table 2.4-5 for the Diesel Generator Building Components Subject to Aging Management Review does not list Flood Gates specifically in any row. Please clarify if the Flood Gates fall into the "Metal components: All structural members" category. If they are not included as an oversight, please provide a description of the scoping and aging management review. If they are covered somewhere else in the LRA, please indicate the location. If they are excluded from the scope of license renewal, please provide the basis for the exclusion.

**AmerGen Response**

Flood Gates associated with the Diesel Generator Building are included in Table 2.4-5 for the component identified as "Metal components: All structural members" to align with an appropriate component name in NUREG-1801. These items are staged near the locations where they are required to be installed in the event of a flood. In addition, these flood gates are high enough to protect the associated structure from the design basis flood; however, they do not encompass the entire vertical opening in the structure.

**RAI # 2.4.5-2**

Section 2.4.5 of the LRA, regarding the Diesel Generator Building, states,

“Steel panels are installed in the equipment access openings on the west side of the building for protection from flood and tornado loads including tornado missiles.”

Table 2.4-5 for the Diesel Generator Building Components Subject to Aging Management Review does not list Missile Protection as an intended function for any components other than Concrete. Please address the absence of the Missile Protection function of the aforementioned steel panels from Table 2.4-5.

**AmerGen Response**

The steel panels in the Diesel Generator Building are included in Table 2.4-5 as the component identified as “Steel components: All structural steel.” The intended function of missile barrier was omitted from the TMI-1 LRA. This intended function should have been included in Table 2.4-5 and Table 3.5.2-5 .

Component information added to Table 2.4-5 is shown as follows:

**Table 2.4-5            Diesel Generator Building**  
**Components Subject to Aging Management Review**

Component Type	Intended Functions
<i>Steel components: All structural steel</i>	<i>Missile Barrier</i>

Aging management information added to Table 3.5.2-5 is shown as follows:

**Table 3.5.2-5 Diesel Generator Building**

<b>Component Type</b>	<b>Intended Function</b>	<b>Material</b>	<b>Environment</b>	<b>Aging Effect Requiring Management</b>	<b>Aging Management Programs</b>	<b>NUREG-1801 Vol. 2 Item</b>	<b>Table 1 Item</b>	<b>Notes</b>
<i>Steel components: All structural steel</i>	<i>Missile Barrier</i>	<i>Carbon Steel</i>	<i>Air – Indoor</i>	<i>Loss of Material/General Corrosion</i>	<i>Structures Monitoring Program (B.2.1.28)</i>	<i>III.A3-12</i>	<i>3.5.1-25</i>	<i>A</i>
<i>Steel components: All structural steel</i>	<i>Missile Barrier</i>	<i>Carbon Steel</i>	<i>Air - Outdoor</i>	<i>Loss of Material/General, Pitting and Crevice Corrosion</i>	<i>Structures Monitoring Program (B.2.1.28)</i>	<i>III.A3-12</i>	<i>3.5.1-25</i>	<i>A</i>

**RAI #2.4.6-1**

Section 2.4.6 of the LRA, regarding the Dike/Flood Control System, states,

“This structure also contains a sluice gate and associated operator supported by a structural steel platform on the inboard side of the dike... The sluice gate and associated operator on the inboard side of the dike are active components and, therefore, are not subject to aging management review.”

The aforementioned structural steel platform is not listed in Table 2.4-6, Components Subject to Aging Management Review, nor is it explicitly excluded from the scope by the Section 2.4.6 evaluation. If it is not included as an oversight, please provide a description of the scoping and aging management review. If it is covered somewhere else in the LRA, please indicate the location. If it is excluded from the scope of license renewal, please provide the basis for the exclusion.

**AmerGen Response**

The structural steel platform noted in the above RAI is within the scope for license renewal with the intended function of structural support, and was omitted from the TMI-1 LRA. This component should have been included in the third paragraph of Section 2.4.6, and Table 2.4-6 and Table 3.5.2-6 as shown below.

**2.4.6 Dike/Flood Control System**

... The earthen dike, reinforced concrete portions of the Storm Drainage and Flood Control Structure, flap gate assembly, sluice gate and operator, ***structural steel platform on the inboard side of the dike*** and corrugated metal pipe are in scope for License Renewal...

Component information added to Table 2.4-6 is shown as follows:

**Table 2.4-6      Dike/Flood Control System  
                         Components Subject to Aging Management Review**

<b>Component Type</b>	<b>Intended Functions</b>
<b><i>Steel components: All structural</i></b>	<b><i>Structural Support</i></b>

Aging management information added to Table 3.5.2-6 is as follows:

**Table 3.5.2-6 Dike/Flood Control System**

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Programs	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
<i>Steel components: All structural steel</i>	<i>Structural Support</i>	<i>Galvanized Steel</i>	<i>Air - Outdoor</i>	<i>Loss of Material/General, Pitting and Crevice Corrosion</i>	<i>Structures Monitoring Program (B.2.1.28)</i>	<i>III.A6-11</i>	<i>3.5.1-47</i>	<i>A, 1</i>

**RAI # 2.4.10-1**

Section 2.4.10 of the LRA, Mechanical Draft Cooling Tower (MDCT) Structures, states that the intended function of the MDCT basin is to provide structural support and a flow path for the inlet and outlet river discharge piping. Within the current licensing basis, please justify the LRA statement that the failure of the building, adjoining TMI-2 structure, and sodium bisulfate tank foundation and dike does not affect the intended functions of the MDCT basin.

**AmerGen Response**

The building, adjoining TMI-2 structure, and sodium bisulfate tank foundation are nonsafety-related structures per the current licensing basis. These structures are not credited with performing any intended functions for License Renewal. Failure of these structures will not affect any intended functions for safety-related SSCs and they are not relied on to demonstrate compliance with any of the 5 regulated events identified per 10 CFR 54.4 (a)(3).

The closest safety-related SSC is piping at the entrance and exit to the MDCT basin which is more than 6 feet below grade or contained within the MDCT basin. This piping performs a pressure boundary intended function for License Renewal that would not be affected by failure of these structures. The piping is protected either by the soil or by the very robust reinforced concrete of the in-scope MDCT basin which is constructed of 2'6" thick reinforced concrete exterior walls and base slab and a 2'0" thick reinforced concrete roof. The MDCT basin roof is also supported by 2'0" thick interior reinforced concrete walls.

For an SSC to be included in scope for License Renewal per 10 CFR 54.4(a)(2) the SSC must be nonsafety-related whose failure could impact an intended function of a safety-related SSC. Since the soil above the pipe or the MDCT basin protects the associated safety-related piping, failure of the not in scope structures noted above cannot impact an intended function for a safety-related SSC. Therefore, these structures were determined not to be in scope for License Renewal.

**RAI # 2.4.12-1**

Section 2.4.12 of the LRA, Natural Draft Cooling Towers, states that the intended function of the reinforced concrete basin is to provide structural support and a flow path for the Circulating Water Pump House. Within the current licensing basis, please justify the LRA statement that the failure of the reinforced concrete hyperbolic towers, the wooden fill structure, and the canopy at the base of the towers does not affect the intended functions of the basin.

**AmerGen Response**

The reinforced concrete hyperbolic towers, the wooden fill structure, and the canopy are nonsafety-related portions of the Natural Draft Cooling Towers (NDCTs) per the current licensing basis. They are not credited with performing any intended functions for License Renewal. Failure of these portions of the NDCTs could affect the intended functions for the nonsafety-related, in-scope (a)(2) basins. However, this does not require that these structures be included in scope for License Renewal per 10 CFR 54.4(a)(2).

For an SSC to be included in scope for License Renewal per 10 CFR 54.4(a)(2), the SSC must be nonsafety-related whose failure could impact an intended function for a safety-related SSC. Since none of the above structures or the in-scope basin are safety-related, a failure cannot impact a safety-related SSC intended function. Therefore, these structures were determined not to be in-scope for License Renewal.

**RAI # 2.4.14-1**

Section 2.4.14, Reactor Building, of the LRA states,

“The foundation mat...is a nominal 9 feet thick with a 2 foot thick concrete slab above the bottom ¼ -inch liner plate.”

Please confirm that the inaccessible floor liner plate of the base mat including the leak chase system and the concrete fill slab above this liner are included in the components listed in Table 2.4-14.

**AmerGen Response**

The inaccessible floor liner plate is included in the component listed in Table 2.4-14 identified as “Steel elements: Liner; Liner anchors; Integral attachments” as indicated per LRA page 2.4-62 and in Table 3.5.2-14 on page 3.5-240.

The concrete fill slab above the liner is included in the component listed in Table 2.4-14 identified as “Concrete: Interior” as indicated per page 2.4-61 and on Table 3.5.2-14 on pages 3.5-214 through 3.5-219.

The “leak chase system” identified in RAI 2.4.14-1 is referred to by the UFSAR section 5.5.5.3.a as the reactor building liner test channels. These test channels do not perform any functions associated with collection or monitoring of equipment leakage and are not subject to the conditions requiring augmented examinations per IWE-1241(a) (e.g., standing water, repeated wetting and drying, persistent leakage, etc.).

The leak test channels are installed above the containment liner seam welds located below the containment base slab. Fillet welds on the outside of the channels attach the channels to the containment liner. The leak test channels extend slightly above the base slab where capped test ports are installed in the channel. The test port caps protect the interior of the test channel against moisture intrusion or other aggressive environments during times other than when performing the ILRT. During performance of the ILRT, the channel test port caps are temporarily removed for a short period of time to expose the liner seam welds to the ILRT test pressure.

The test channels are not credited with performing any intended functions for License Renewal and, therefore, the channels are not in scope for License Renewal. Specifically, they do not provide intended functions for structural support or pressure boundary. Failure of the test channels will not affect any intended functions for other safety-related SSCs and they are not relied on to demonstrate compliance with any of the 5 regulated events identified per 10 CFR 54.4 (a)(3).

The fillet welds attaching the test channels to the liner are considered integral attachments to the containment liner per IWE-1210 and are included in scope for license renewal. The in scope integral attachment welds are subject to an AMR as for the component type identified as “Steel elements: Liner; Liner anchors; Integral attachments” as indicated per Table 3.5.2-14, page 3.5-240.

**RAI # 2.4.16-1**

Section 2.4.16, Service Building, of the LRA states,

“The evaluation boundary for the Service Building includes the Service Building and Machine Shop, which are classified as Class III structures and designed to withstand the effects of normal operating loads.”

“The purpose of the Service Building is to provide structural support, shelter, and protection for safety-related mechanical components required for safe operation of the plant, including safe shutdown of the reactor.”

Per UFSAR Section 5.1.1.3, Class III structures, systems, and components (SSC) are those SSC which are not related to reactor operation. As such, the staff finds the above statements within the LRA contradictory and in need of clarification.

**AmerGen Response**

The Service Building is identified as a Class III structure per UFSAR Section 5.1.1.3.a and there is safety-related equipment physically located in the Building. This building was identified as being in the scope of License Renewal because failure of the nonsafety-related building could affect the intended functions associated with the safety-related equipment contained therein as required per 10 CFR 54.4(a)(2).

The need for clarification of the contradictory UFSAR statement has been entered in the TMI-1 corrective action program.

**RAI # 2.4.16-2**

Section 2.4.16, Service Building, of the LRA states,

“Some of the interior reinforced concrete piers and a portion of the exterior reinforced concrete grade beam are supported on the reinforced concrete circulating water pipe tunnel which passes under the Service Building concrete floor slab at elevation 305'-0.”

Table 2.4-16 does not explicitly refer to the reinforced concrete circulating water pipe tunnel, nor does Section 2.4.11, Miscellaneous Yard Structures. Please confirm that the reinforced concrete circulating water pipe tunnel which provides support for the Service Building is included in the scope of license renewal. If it is not included as an oversight, please provide a description of the scoping and aging management review. If it is covered somewhere else in the LRA, please indicate the location. If it is excluded from the scope of license renewal, please provide the basis for the exclusion.

**AmerGen Response**

The reinforced concrete circulating water pipe tunnel is included in the scope of license renewal as part of the Circulating Water System per Section 2.3.3.3 of the LRA. The pipe tunnel is included in the component type “piping and fittings” as indicated in Table 2.3.3-3 on page 2.3-72. This tunnel performs intended functions for pressure boundary and structural support. The intended function of structural support was omitted from the TMI-1 LRA. This intended function should have been included in Table 2.3.3-3 as follows:

**Table 2.3.3-3      Circulating Water System  
Components Subject to Aging Management Review**

Component Type	Intended Functions
Piping and fittings	Pressure Boundary/ <i>Structural Support</i>

The Aging Effects Requiring Management List and Aging Management Programs List in Section 3.3.2.1.3 should have included the following:

**3.3.2.1.3      Circulating Water System****Aging Effects Requiring Management**

- ~~Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling/ Aggressive Chemical Attack~~
- ***Loss of Material/Abrasion; Cavitation***

**Aging Management Programs**

- ***Structures Monitoring (B.2.1.28)***

Section 3.5.2.2.1 should have read:

**3.5.2.2.1 Aging of Structures Not Covered by Structures Monitoring Program**

- (5) *Cracking due to expansion and reaction with aggregates for Groups 1-5, 7-9 structures.*

At TMI-1, cracking due to reaction with aggregates for Groups 1, 3, 4, and 5 structures is monitored through Structures Monitoring Program, and thus a further evaluation is not necessary.

***A visual inspection to detect cracking due to reaction with aggregates on the internal surfaces of the Circulating Water System concrete tunnel is performed under the Open-Cycle Cooling Water System, B.2.1.9 and Structures Monitoring Program, B.2.1.28.***

- (6) *Cracks and distortion due to increased stress levels from settlement for Groups 1-3, 5-9 structures.*

At TMI-1, structure Groups 1, 4, and 5 are not subject to cracks and distortion due to increased stress levels from settlement. Foundation for the structures is founded on bedrock and a de-watering system is not used. Group 3 structures whose foundation is founded on soil (without a de-watering system) are subject to cracks and distortion due to increased stress levels from settlement. The **Group 3** structures are monitored under the Structures Monitoring Program (B.2.1.28) and thus further evaluation is not necessary.

***A visual inspection to detect cracks and distortion due to increased stress levels from settlement on the internal surfaces of the Circulating Water System concrete tunnel is performed under the Open-Cycle Cooling Water System, B.2.1.9 and Structures Monitoring Program, B.2.1.28.***

Section 3.5.2.2.2 should have included a discussion of the inaccessible surfaces of the Circulating Water System concrete tunnel as follows:

**3.5.2.2.2 Aging Management of Inaccessible Areas**

- (2) ***There are no inaccessible internal surfaces of the Circulating Water System concrete tunnel.***
- (3) ***There are no inaccessible internal surfaces of the Circulating Water System concrete tunnel.***

Section 3.5.2.2.2.4 should have included a discussion of the Circulating Water System concrete tunnel as follows:

**3.5.2.2.2.4 Aging Management of Inaccessible Areas for Group 6 Structures**

- (3) ***There are no inaccessible internal surfaces of the Circulating Water System concrete tunnel.***

Table 3.5.1, Summary of Aging Management Evaluations for Structures and Component Supports should have included a discussion of the Open-Cycling Cooling Water System (B.2.1.9) as follows:

The Discussion for Item Number 3.5.1-27 should have read:

***Not consistent*** ~~Consistent~~ with NUREG-1801. The Structures Monitoring Program, B.2.1.28, will be used to manage cracking of interior/exterior concrete in accessible and inaccessible areas regardless of aging mechanism.

***The Open-Cycle Cooling Water System, B.2.1.9 and Structures Monitoring Program, B.2.1.28 will be used to manage cracking due to expansion and reaction with aggregates on the internal surfaces of the Circulating Water System concrete tunnel.***

See Subsection 3.5.2.2.2.1 and 3.5.2.2.2.2.

The Discussion for Item Number 3.5.1-28 should have read:

***Not consistent*** ~~Consistent~~ with NUREG-1801. The Structures Monitoring Program, B.2.1.28, will be used to manage cracks and distortion due to increased stress levels from settlement for structures founded on soil. A dewatering system is not relied upon to mitigate cracking and distortion due to increased stress levels from settlement.

***The Open-Cycle Cooling Water System, B.2.1.9 and Structures Monitoring Program, B.2.1.28 will be used to manage cracks and distortion due to increased stress levels from settlement on the internal surfaces of the Circulating Water System concrete tunnel.***

See Subsections 3.5.2.2.2.1 and 3.5.2.2.2.3.

The Discussion for Item Number 3.5.1-37 should have read:

***Not consistent*** ~~Consistent~~ with NUREG-1801. The Structures Monitoring Program, B.2.1.28, will be used to manage increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide for reinforced concrete in accessible areas of Group 6 structures.

***The Open-Cycle Cooling Water System, B.2.1.9 and Structures Monitoring Program, B.2.1.28 will be used to manage increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide on the internal surfaces of the Circulating Water System concrete tunnel.***

Further evaluation of inaccessible areas is provided in Subsection 3.5.2.2.2.4.3.

The Discussion for Item Number 3.5.1-45 should have read:

***Not consistent*** Consistent with NUREG-1801. The Structures Monitoring Program, B.2.1.28, will be used to monitor loss of material due to abrasion and cavitation in water control structures (Group 6 structures).

***The Open-Cycle Cooling Water System, B.2.1.9 and Structures Monitoring Program, B.2.1.28 will be used to monitor loss of material due to abrasion and cavitation in the Circulating Water System concrete tunnel.***

The Exceptions to NUREG-1801 listed in Section B.2.1.9 should have included the following:

#### **B.2.1.9 Open Cycle Cooling Water System**

##### **Exceptions to NUREG-1801**

- ~~Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)/ Aggressive chemical attack~~
- ***Cracks and Distortion due to Increased Stress Levels from Settlement***
- ***Loss of Material due to Abrasion; Cavitation***

The Enhancements to the Structures Monitoring Program, B.2.1.28 should have included the following:

#### **B.2.1.28 Structures Monitoring Program**

##### **Enhancements**

- Monitor reinforced concrete submerged in raw water associated with Intake Screen and Pumphouse, Circulating Water Pump House, Mechanical Draft Cooling Tower Structures, Natural Draft Cooling Tower Basins ***and Circulating Water tunnel.***

Aging management information associated with the intended function for structural support and additional changes to correct errors identified for various aging effects and aging management programs have been included in Table 3.3.2-3 shown as follows:

**Table 3.3.2-3**  
**Circulating Water System**  
**Summary of Aging Management Evaluation**

**Table 3.3.2-3**      **Circulating Water System**

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary/ <i>Structural Support</i>	Concrete	Raw Water (Internal)	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)/Corrosion of embedded steel	Open-Cycle Cooling Water System (B.2.1.9)	III.A3-4	3.5.1-34	E, 3  G
<i>Piping and fittings</i>	<i>Pressure Boundary/ Structural Support</i>	<i>Concrete</i>	<i>Raw Water (Internal)</i>	<i>Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)/Corrosion of embedded steel</i>	<i>Structures Monitoring Program (B.2.1.28)</i>			G
Piping and fittings	Pressure Boundary/ <i>Structural Support</i>	Concrete	Raw Water (Internal)	Cracking/Expansion and Reaction with Aggregates	Open-Cycle Cooling Water System (B.2.1.9)	III.A3-2	3.5.1-27	E, 3
<i>Piping and fittings</i>	<i>Pressure Boundary/ Structural Support</i>	<i>Concrete</i>	<i>Raw Water (Internal)</i>	<i>Cracking/Expansion and Reaction with Aggregates</i>	<i>Structures Monitoring Program (B.2.1.28)</i>	<i>III.A3-2</i>	<i>3.5.1-27</i>	A
<i>Piping and fittings</i>	<i>Pressure Boundary/ Structural Support</i>	<i>Concrete</i>	<i>Raw Water (Internal)</i>	<i>Cracks and Distortion/Increased Stress Levels from Settlement</i>	<i>Open-Cycle Cooling Water System (B.2.1.9)</i>	<i>III.A3-3</i>	<i>3.5.1-28</i>	E, 3
<i>Piping and fittings</i>	<i>Pressure Boundary/ Structural Support</i>	<i>Concrete</i>	<i>Raw Water (Internal)</i>	<i>Cracks and Distortion/Increased Stress Levels from Settlement</i>	<i>Structures Monitoring Program (B.2.1.28)</i>	<i>III.A3-3</i>	<i>3.5.1-28</i>	A

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary/ <b>Structural Support</b>	Concrete	Raw Water (Internal)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)/ Aggressive chemical attack	<del>Open-Cycle Cooling Water System (B.2.1.9)</del>  <b>None</b>	<del>III.A3-5</del>  <b>III.A6-3</b>	3.5.1-34  3.5.1-34	E, 3  I, 7
Piping and fittings	Pressure Boundary/ <b>Structural Support</b>	Concrete	Raw Water (Internal)	Increase in Porosity and Permeability, Loss of Strength/ Leaching of calcium hydroxide	Open-Cycle Cooling Water System (B.2.1.9)	<u>III.A6-6</u>	3.5.1-37	E, 3
<b>Piping and fittings</b>	<b>Pressure Boundary/ Structural Support</b>	<b>Concrete</b>	<b>Raw Water (Internal)</b>	<b>Increase in Porosity and Permeability, Loss of Strength/ Leaching of calcium hydroxide</b>	<b>Structures Monitoring Program (B.2.1.28)</b>	<u>III.A6-6</u>	3.5.1-37	<b>A, 9</b>
<b>Piping and fittings</b>	<b>Pressure Boundary/ Structural Support</b>	<b>Concrete</b>	<b>Raw Water (Internal)</b>	<b>Loss of Material/ Abrasion; Cavitation</b>	<b>Open-Cycle Cooling Water System (B.2.1.9)</b>	<u>III.A6-7</u>	3.5.1-45	<b>E, 3</b>
<b>Piping and fittings</b>	<b>Pressure Boundary/ Structural Support</b>	<b>Concrete</b>	<b>Raw Water (Internal)</b>	<b>Loss of Material/ Abrasion; Cavitation</b>	<b>Structures Monitoring Program (B.2.1.28)</b>	<u>III.A6-7</u>	3.5.1-45	<b>A, 9</b>
Piping and fittings	Pressure Boundary/ <b>Structural Support</b>	Concrete	<b>Groundwater/ Soil (External)</b>	Cracking, Loss of Bond, and Loss of Material (Spalling, Scaling)/Corrosion of embedded steel	None  <b>Structures Monitoring Program (B.2.1.28)</b>	III.A3-4	3.5.1-31	I, 5  <b>A</b>
Piping and fittings	Pressure Boundary/ <b>Structural Support</b>	Concrete	<b>Groundwater/ Soil (External)</b>	Cracking/Expansion and Reaction with Aggregates	None  <b>Structures Monitoring Program (B.2.1.28)</b>	III.A3-2	3.5.1-27	I, 4  <b>A</b>

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Piping and fittings	Pressure Boundary/ <b>Structural Support</b>	Concrete	<b>Groundwater/</b> Soil (External)	Cracks and Distortion/Increased stress levels from settlement	None  <b>Structures Monitoring Program (B.2.1.28)</b>	III.A3-3	3.5.1-28	4,6  A
Piping and fittings	Pressure Boundary/ <b>Structural Support</b>	Concrete	<b>Groundwater/</b> Soil (External)	Increase in Porosity and Permeability, Cracking, Loss of Material (Spalling, Scaling)/ Aggressive chemical attack	None	III.A3-5	3.5.1-31	1, 7

**Plant Specific Notes**

4. For concrete in a soil environment, cracking and expansion due to reaction with aggregates is not applicable.

5. For concrete in a soil environment, cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel is not applicable.

6. For concrete in a soil environment, cracks and distortion due to increased stress levels from settlement is not applicable.

7. For concrete in a **groundwater/soil or raw water** environment, increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack is not applicable **because the environment is non-aggressive.**

9. The NUREG-1801 Volume 2 Aging Management Program for this material/environment combination is the Chapter XI.S7, RG 1.127, "Inspection of Water Control Structures Associated with Nuclear Power Plants", which states "For plants not committed to RG 1.127, Revision 1, aging management of water control structures may be included in the Structures Monitoring Program (XI.S6). However, details pertaining to water control structures are to incorporate the attributes described herein." The Structures Monitoring Program was evaluated and determined to contain the 10 attributes associated with RG 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plant; therefore the Structures Monitoring Program will be used as the aging management program for this material/environmental combination.

**RAI # 2.4.19-1**

Section 2.4.19, Turbine Building, of the LRA states,

“The purpose of the buildings is to provide structural support, shelter and protection for mechanical and electrical equipment required for safe operation of the plant, including safe shutdown of the reactor.”

Section 5.4.3.2.5 of the TMI UFSAR states,

“There is no equipment located in the Turbine Building that is required for safe shutdown of the plant.”

The staff finds these statements contradictory and in need of clarification.

**AmerGen Response**

The Turbine Building is identified as a Class III structure per UFSAR Section 5.1.1.3.a and there is safety-related equipment physically located in the Building. This building was identified as being in the scope of License Renewal because failure of the nonsafety-related building could affect the intended functions associated with the safety-related equipment contained therein as required per 10 CFR 54.4(a)(2).

The need for clarification of the contradictory UFSAR statement as noted has been identified in the TMI-1 corrective action program.

**RAI#: 2.5.1**

Operating experience has shown that cable tie-wraps can fail as a result of age-related brittleness of the plastic material. These cable tie-wraps would be considered long-lived passive components depending on whether they have a credited design function. Some possible intended design functions include: maintaining spacing for power cable ampacity; maintaining stiffness in unsupported lengths of wire bundles to ensure minimum bending radius; and maintaining cables within vertical raceways, among others. Most recently, at Point Beach, the regional inspectors identified an unresolved item (Inspection Report 05000266/2006006; 05000301/2006006) after noticing that the current configuration of the plant may not be consistent with plant design documents due to the age-related breakage of a large number of plastic tie-wraps used to fasten wires and cables. At Point Beach, cable tie-wraps are used to maintain cable ampacity or are used to seismically qualify the cable tray system. Explain how Three Mile Island manages the aging of cable tie-wraps if they are credited in the plant design basis. In addition, justify the exclusion of cable tie-wraps from the scope of license renewal (see 10 CFR 54.4).

**AmerGen Response**

Three Mile Island Unit 1 (TMI-1) uses cable tie-wraps in cable installations. At TMI-1 cable tie-wraps implement standard practices to bundle cables and provide a neat and orderly installation. TMI-1 cable tie-wraps do not perform a 10 CFR 54.4 intended function, including having no (a)(2) intended functions since the failure of cable tie-wraps will not impact the performance of safety related license renewal functions. Therefore, cable tie-wraps at TMI-1 are not within the scope of license renewal, are not subject to aging management review and do not require an aging management program.

TMI-1 has no current licensing basis (CLB) requirements that cable tie wraps remain functional during and following design basis events. The evaluation of TMI-1's cable tie-wraps included a review of TMI-1 documents and processes that address seismic design and classification, Seismic Qualification Utility Group (SQUG) methodology and commitments, instrumentation and control system design, general cable considerations, separation of redundant circuits, and cable tray loading and separation. TMI-1 documents and processes reviewed included the TMI-1 UFSAR, TMI-1 commitments, design documents including specifications, design and installation procedures, and TMI-1 specific operating experience (OE) for cable tie-wraps. This review was performed considering TMI-1 electrical system and electrical commodity group scoping and screening methodologies and the Point Beach operating experience. After researching and reviewing related documentation, it was determined that the TMI-1 cable tie-wraps do not perform a license renewal intended function. TMI-1's cable tie-wraps are not credited for maintaining cable ampacity, maintaining stiffness in unsupported lengths of bundle wires to ensure minimum bending radius, nor maintaining cables within vertical raceways. The seismic qualification of TMI-1's cable trays does not credit the use of cable tie-wraps. TMI-1 specific OE indicates that cable tie-wrap issues are limited to those addressed by the TMI-1 housekeeping and foreign material exclusion programs. A search of TMI-1 OE did not identify equipment failures due to the failure of a cable tie-wrap.