



RS-13-049  
TMI-13-017

10 CFR 50.54(f)

March 12, 2013

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555

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

**Subject:** Response to March 12, 2012, Request for Information Enclosure 2,  
Recommendation 2.1, Flooding, Required Response 2, Flooding Hazard  
Reevaluation Report

**References:**

1. NRC Letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, dated March 12, 2012
2. NRC Letter, Prioritization of Response Due Dates for Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Flooding Hazard Reevaluations for Recommendations 2.1 of the Near-Term Task Force Review of Insights From the Fukushima Dai-Ichi Accident, dated May 11, 2012
3. U.S. Nuclear Regulatory Commission, NUREG/CR-7046, "Design-Basis Flood Estimation for Site Characterization at Nuclear Power Plants in the United States of America", dated November 2011
4. Letter from David L. Skeen, U.S. Nuclear Regulatory Commission, to Joseph E. Pollock, Nuclear Energy Institute, "Trigger Conditions for Performing an Integrated Assessment and Due Date for Response", dated December 3, 2012
5. U.S. Nuclear Regulatory Commission, JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding", dated November 30, 2012
6. Letter from Exelon Generation Company, LLC (EGC), to U.S. Nuclear Regulatory Commission, "180-day Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident", TMI Unit 1 Letter RS-12-176, dated November 19, 2012

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On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding. One of the Required Responses in this letter directed licensees to submit a Hazard Reevaluation Report, including the interim action plan requested in Item 1.d of Reference 1, Enclosure 2, if appropriate. On May 11, 2012, the NRC issued the prioritization plan developed by the NRC and the resultant Flooding Hazard Reevaluation due dates for all sites. Reference 2, Enclosure 1 identified the Three Mile Island Nuclear Station, Unit 1 site as a Category 1 site requiring a Flooding Hazard Reevaluation Report submittal due date of March 12, 2013. Enclosure 1 to this letter provides the Three Mile Island Nuclear Station, Unit 1 (TMI Unit 1) Flooding Hazard Reevaluation Report. The TMI Unit 1 Flooding Hazard Reevaluation Report follows the reevaluation process described in Reference 3.

Response to Information Requested in Reference 1, Enclosure 2

**a. Site information related to the flood hazard. Relevant SSCs important to safety and the UHS are included in the scope of this reevaluation, and pertinent data concerning these SSCs should be included. Other relevant site data includes the following:**

**i. Detailed site information (both designed and as-built), including present-day site layout, elevation of pertinent SSCs important to safety, site topography, as well as pertinent spatial and temporal data sets;**

- The elevation of pertinent TMI Unit 1 SSCs important to safety is described in Enclosure 1, Section 3.a.
- TMI site topographic map is provided in Enclosure 2.
- TMI Pertinent Site Data is provided in Enclosure 3.

**ii. Current design basis flood elevations for all flood causing mechanisms;**

- Section 3.b of Enclosure 1 describes the TMI Unit 1 current design basis flood elevations for all flood causing mechanisms.

**iii. Flood-related changes to the licensing basis and any flood protection changes (including mitigation) since license issuance;**

- Section 3.c of Enclosure 1 describes flood-related changes to the TMI Unit 1 licensing basis and any flood protection changes (including mitigation) since license issuance.

**iv. Changes to the watershed and local area since license issuance;**

- Section 3.d of Enclosure 1 describes changes to the watershed and local area since TMI Unit 1 license issuance.

**v. Current licensing basis (CLB) flood protection and pertinent flood mitigation features at the site;**

- Section 3.e of Enclosure 1 describes the TMI Unit 1 CLB flood protection and pertinent flood mitigation features at the site.

**vi. Additional site details, as necessary, to assess the flood hazard (i.e., bathymetry, walkdown results, etc.)**

- Reference 6 provides the TMI, Unit 1 flooding walkdown results performed in accordance with NRC NTTF Recommendation 2.3.

**b. Evaluation of the flood hazard for each flood causing mechanism, based on present-day methodologies and regulatory guidance. Provide an analysis of each flood causing mechanism that may impact the site including local intense precipitation and site drainage, flooding in streams and rivers, dam breaches and failures, storm surge and seiche, tsunami, channel migration or diversion, and combined effects. Mechanisms that are not applicable at the site may be screened-out; however, a justification should be provided. Provide a basis for inputs and assumptions, methodologies and models used including input and output files, and other pertinent data.**

- A description of the TMI Unit 1 flood hazard reevaluation for each flood causing mechanism and the basis for inputs, assumptions, methodologies, and models are referenced below:
  - Local Intense Precipitation and Site Drainage: See Section 4.a of Enclosure 1.
  - Flooding in Streams and Rivers: See Section 4.b of Enclosure 1.
  - Dam Breaches and Failures: See Section 4.c of Enclosure 1.
  - Storm Surge: See Section 4.d of Enclosure 1.
  - Seiche: See Section 4.e of Enclosure 1.
  - Tsunami: See Section 4.f of Enclosure 1.
  - Ice Induced Flooding: See Section 4.g of Enclosure 1.
  - Channel Migration or Diversion: See Section 4.h of Enclosure 1.
  - Combined Effects Flood: See Section 4.i of Enclosure 1.
    - Wind generated waves
    - Hydrodynamic Loads
    - Debris Loads
- Per NRC/NEI public meeting, dated January 16, 2013, input-output files are not included with the Flood Hazard Reevaluation Report but are available for inspection upon request.

**c. Comparison of current and reevaluated flood causing mechanisms at the site. Provide an assessment of the current design basis flood elevation to the reevaluated flood elevation for each flood causing mechanism. Include how the findings from Enclosure 4 of the 50.54(f) letter (i.e., Recommendation 2.3 flood walkdowns) support this determination. If the current design basis flood bounds the reevaluated hazard for all flood causing mechanisms, include how this finding was determined.**

- The current TMI Unit 1 design basis flood hazard elevation bounds the reevaluated hazard for all flood causing mechanisms applicable to the site with the exception of local intense precipitation. A comparison of current and reevaluated flood hazard elevations for all flood causing mechanisms at the TMI Unit 1 site is provided in Enclosure 1, Section 5, Table 24, and summarized below.

<b>Flood Causing Mechanism</b>	<b>Current Licensing Basis Flood Hazard Elevation</b>	<b>Flood Hazard Reevaluation Elevation</b>	<b>Licensing Basis Bounds Reevaluation Flood Hazard?</b>
Local Intense Precipitation	Not addressed by design basis.	Varies from 305.1 ft NGVD-29 to 305.4 ft NGVD-29 at pathways to TMI Unit 1 Safety Related Structures.	Not Bounded
Flooding in Streams and Rivers	313.3 ft NGVD-29 at the ISPH.	313.2 ft NGVD-29 at the ISPH. This includes the combined effects of PMF, dam break, and wind-generated waves.	Bounded
Dam Breaches and Failures	301.6 ft NGVD-29 at the ISPH.	298.3 ft NGVD-29 at the ISPH. This includes the combined effects of seismic dam failure, a high discharge event and wind-generated waves.	Bounded
Storm Surge	Not addressed by design basis.	Not an applicable flood causing mechanism.	Not Applicable
Seiche	Not addressed by design basis.	Not an applicable flood causing mechanism.	Not Applicable
Tsunami	Not addressed by design basis.	Not an applicable flood causing mechanism.	Not Applicable
Ice Induced Flooding	Not addressed by design basis.	292.0 ft NGVD-29 for the historical most severe ice jam event peak flow of 588,000 cfs.	Bounded
Channel Migration of Diversion	Not addressed by design basis.	Based on a historic review, there is no tendency for channel migration and diversion that would affect the flood hazard.	Bounded

- An assessment of the effects of hydrodynamic and debris loads on TMI Unit 1 safety-related structures is described in Section 4.i of Enclosure 1.
- The effects of wind-generated waves were not considered in the TMI Unit 1 current licensing basis flood hazard. As previously planned, EGC is submitting a license amendment request to update the current licensing basis to include wind-generated waves in the TMI Unit 1 licensing basis flood hazard.
- The margin between the reevaluated hazard and the current design flood protection was reviewed. The minimum difference between the maximum still water surface elevation and the minimum elevation of flood barriers is 2.5 feet. The effect of waves on this margin is minimal when the affected barriers are interior to plant structures which attenuate the waves. The minimum available physical margin assuming a conservatively determined maximum wave height above the Probable Maximum Flood water surface elevation is 0.7 feet at the air intake pagoda.

***d. Interim evaluation and actions taken or planned to address any higher flooding hazards relative to the design basis, prior to completion of the integrated assessment described below, if necessary.***

In accordance with Reference 4, "Scenario 2 - Only Local Intense Precipitation" applies to TMI Unit 1. Based on the LIP evaluation provided below, no interim actions or an Integrated Assessment are required.

"If local intense precipitation is the only portion of the reevaluated hazard that is not bounded by the current design basis, the licensee can limit the evaluation to only the site drainage. Per Reference 5, Section A.1.1.6, "Storm Drainage Systems", "if credited, the licensee should evaluate the storm drainage systems to demonstrate they are capable of passing sufficient flow to accommodate the reevaluated flood flow rate while maintaining the flood height not greater than the allowable value."

The only TMI Unit 1 drainage system feature credited in the LIP event as providing conveyance is the 60-inch outlet pipe through the east side of dike. The 60-inch inch pipe is approximately 100 feet long. The potential sources of debris are very limited. The water flowing to this pipe would be from precipitation on the northeast side of the TMI Unit 1 site. This area is within the "owner controlled area". Small sediment material transported to the pipe is expected to pass with little or no accumulation. Additionally, there is not a significant amount of vegetation that could accumulate and create a significant blockage in such a short duration event. The TMI Unit 1 LIP analysis conservatively assumed 50% blockage of the pipe. This 60-inch drainage pipe is capable of passing sufficient flow to accommodate the reevaluated flood flow rate while maintaining the flood height below the allowable value (Reference Enclosure 1, Section 4.a).

**e. Additional actions beyond Requested Information item 1.d taken or planned to address flooding hazards, if any.**

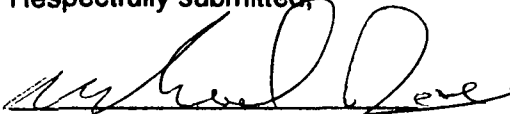
TMI Unit 1 has implemented a mitigation strategy for beyond design basis external events to maintain core cooling for flooding events with peak water elevations up to 320 feet (NGVD-29). Additional mitigation strategy improvements are being developed to improve the reliability of that capability and to address spent fuel pool cooling.

This letter does not contain any new or revised Regulatory Commitments.

If you have any questions regarding this submittal, please contact Ron Gaston at (630) 657-3359.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 12<sup>th</sup> day of March 2013.

Respectfully submitted,



Michael D. Jesse  
Director - Licensing & Regulatory Affairs  
Exelon Generation Company, LLC

**Enclosures:**

1. Three Mile Island Nuclear Power Station Flood Hazard Reevaluation Report, Revision 1, In Response to the 50.54(f) Information Request Regarding Near-Term Task Force Recommendation 2.1 Flooding
2. TMI Site Topography Map
3. CD-R labeled: "Three Mile Island Nuclear Station Pertinent Site Data"  
**Document Components:**

TMI\_2DModel\_DEM\_NAVD88\_Locked\_Layers.dwg  
(requires AUTOCAD)

cc: Director, Office of Nuclear Reactor Regulation (w/o Enclosure 3)  
Regional Administrator - NRC Region I (w/o Enclosure 3)  
NRC Senior Resident Inspector - Three Mile Island Nuclear Station, Unit 1  
NRC Project Manager, NRR - Three Mile Island Nuclear Station, Unit 1  
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Mr. Eric E. Bowman, NRR/DPR/PGCB, NRC or Ms. Eileen M. McKenna,  
NRO/DSRA/BPTS, NRC  
Director, Bureau of Radiation Protection – Pennsylvania Department of Environmental  
Resources (w/o Enclosure 3)  
Chairman, Board of County Commissioners of Dauphin County, PA (w/o Enclosure 3)  
Chairman, Board of Supervisors of Londonderry Township, PA (w/o Enclosure 3)  
R. R. Janati, Commonwealth of Pennsylvania (w/o Enclosure 3)

**Enclosure 1**

Three Mile Island Nuclear Power Station  
Flood Hazard Reevaluation Report, Revision 1  
In Response to the 50.54(f) Information Request  
Regarding Near-Term Task Force  
Recommendation 2.1 Flooding

(64 Pages)