



10 CFR 50.54(f)

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TMI-16-051

August 31, 2016

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

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

Subject: Spent Fuel Pool Evaluation Supplemental Report, Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

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 (ML12053A340)
2. NRC Letter, Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendation 2.1 "Seismic" of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated October 27, 2015 (ML15194A015)
3. NEI Letter, Request for Endorsement of Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation (EPRI 3002007148), dated February 23, 2016 (ML16055A017)
4. EPRI 3002007148, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation, February 2016
5. NRC Letter, Endorsement of Electric Power Research Institute Report 3002007148, "Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation", dated March 17, 2016 (ML15350A158)

6. Exelon Generation Company, LLC Letter to USNRC, Seismic Hazard and Screening Report (Central and Eastern United States (CEUS) Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 31, 2014 (RS-14-073) (ML14090A271)
7. NRC Letter to Exelon Generation Company, LLC, Three Mile Island Nuclear Station, Unit 1, Staff Assessment of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated August 14, 2015 (ML15223A215)
8. EPRI 1025287, Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details [SPID] for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic, February 2013

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued a Request for Information per 10 CFR 50.54(f) (Reference 1) to all power reactor licensees. Enclosure 1, Item (9) of the 50.54(f) letter requested addressees to provide spent fuel pool (SFP) integrity evaluations with any actions identified to address any discovered vulnerabilities. By letter dated October 27, 2015 (Reference 2), the NRC transmitted final seismic information request tables which identified that Three Mile Island Nuclear Station, Unit 1 is to conduct a limited scope SFP evaluation. By Reference 3, Nuclear Energy Institute (NEI) submitted an Electric Power Research Institute (EPRI) report entitled, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation (EPRI 3002007148) (Reference 4) for NRC review and endorsement. NRC endorsement was provided by Reference 5.

EPRI 3002007148 provides criteria for evaluating the seismic adequacy of a SFP to the reevaluated ground motion response spectrum (GMRS) hazard levels. The reevaluated GMRS, used for the SFP seismic demand, are documented in Reference 6 and endorsed by the NRC by Reference 7. This report supplements the guidance in the Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details (SPID) (Reference 8), for plants where the GMRS peak spectral acceleration is less than or equal to 0.8g. Section 3.3 of EPRI 3002007148 lists the parameters to be verified to confirm that the results of the report are applicable to Three Mile Island Nuclear Station, Unit 1, and that the Three Mile Island Nuclear Station, Unit 1, SFP is seismically adequate in accordance with Near Term Task Force (NTTF) 2.1 Seismic evaluation criteria.

The attachment to this letter provides the data for Three Mile Island Nuclear Station, Unit 1, that confirms applicability of the EPRI 3002007148 criteria, confirms that the SFP is seismically adequate, and provides the requested information in response to Item (9) of the 50.54 (f) letter associated with NTTF Recommendation 2.1 Seismic evaluation criteria.

This letter closes Regulatory Commitment No. 2 of Reference 6.

This letter contains no new regulatory commitments or revisions to existing regulatory commitments.

If you have any questions regarding this report, please contact Ronald Gaston at 630-657-3359.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 31st day of August 2016.

Respectfully submitted,



James Barstow
Director - Licensing & Regulatory Affairs
Exelon Generation Company, LLC

Attachment: Site-Specific Spent Fuel Pool Criteria for Three Mile Island Nuclear Station, Unit 1

cc: Regional Administrator - NRC Region I
NRC Senior Resident Inspector – Three Mile Island Nuclear Station
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ATTACHMENT

Site-Specific Spent Fuel Pool Criteria for Three Mile Island Nuclear Station, Unit 1

The 10 CFR 50.54(f) letter requested that, in conjunction with the response to Near Term Task Force (NTTF) Recommendation 2.1, a seismic evaluation be made of the SFP. More specifically, plants were asked to consider “all seismically induced failures that can lead to draining of the SFP.” Such an evaluation would be needed for any plant in which the ground motion response spectrum (GMRS) exceeds the safe shutdown earthquake (SSE) in the 1 to 10 Hz frequency range. The NRC staff confirmed through References A and D that the GMRS exceeds the SSE and concluded that a SFP evaluation is merited for the Three Mile Island Nuclear Station, Unit 1. By letter dated March 17, 2016 (Reference B) the NRC staff determined that EPRI 3002007148 was an acceptable approach for performing SFP evaluations for plants where the peak spectral acceleration is less than or equal to 0.8g.

The table below lists the criteria from Section 3.3 of EPRI 3002007148 along with data for Three Mile Island Nuclear Station, Unit 1 that confirms applicability of the EPRI 3002007148 criteria and confirms that the SFP is seismically adequate and can retain adequate water inventory for 72 hours in accordance with NTTF 2.1 Seismic evaluation criteria.

SFP Criteria from EPRI 3002007148	Site-Specific Data
Site Parameters	
1. The site-specific GMRS peak spectral acceleration at any frequency should be less than or equal to 0.8g.	The GMRS peak spectral acceleration in Reference C Table 2.4-1, as accepted by the NRC in Reference D, is 0.465g, which is $\leq 0.8g$; therefore, this criterion is met.
Structural Parameters	
2. The structure housing the SFP should be designed using an SSE with a peak ground acceleration (PGA) of at least 0.1g.	The SFP is housed in the Fuel Handling Building, which is seismically designed to the site SSE with a PGA of 0.12g (Reference C, Section 3.1). The Three Mile Island Nuclear Station, Unit 1 PGA is greater than 0.1g; therefore, this criterion is met.
3. The structural load path to the SFP should consist of some combination of reinforced concrete shear wall elements, reinforced concrete frame elements, post-tensioned concrete elements and/or structural steel frame elements.	The structural load path from the foundation to the SFP consists of reinforced concrete boundary and intermediate bearing walls to its mat foundation on bedrock (Reference E, Sections 2.7.5.2 and 9.7.1.1 and Reference F); therefore, this criterion is met for Three Mile Island Nuclear Station, Unit 1.
4. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.	The SFP structure is included in the Three Mile Island Nuclear Station, Unit 1 Structures Monitoring Program (Reference G) in accordance with 10 CFR 50.65, which monitors the performance or condition of structures, systems, or components (SSCs) in a manner sufficient to provide reasonable assurance that these SSCs are capable of fulfilling their intended functions. Therefore, this criterion is met for Three Mile Island Nuclear Station, Unit 1.

SFP Criteria from EPRI 3002007148	Site-Specific Data
Non-Structural Parameters	
<p>5. To confirm applicability of the piping evaluation in Section 3.2 of EPRI 3002007148, piping attached to the SFP up to the first valve should have been evaluated for the SSE.</p>	<p>Piping attached to the SFP is evaluated to the SSE as documented in Reference E, Section 5.1.1.1.f; therefore, this criterion is met for Three Mile Island Nuclear Station, Unit 1.</p>
<p>6. Anti-siphoning devices should be installed on any piping that could lead to siphoning water from the SFP. In addition, for any cases where active anti-siphoning devices are attached to 2-inch or smaller piping and have extremely large extended operators, the valves should be walked down to confirm adequate lateral support.</p>	<p>Reference E, Section 9.4 states: <i>"The most serious failure of the Spent Fuel Cooling System would be complete loss of water from both spent fuel storage pools. To protect against this possibility, the cooling water inlet and outlet connections to spent fuel pool B all enter slightly below, or at, the normal water level in the pool. Fuel pool A has a drain connection from the spent fuel cooling system extending downward from elevation 330 ft (10 ft above the top of fuel stored in this pool) to 2 inches above the bottom of the pool. This line has a siphon breaker with a normally locked open valve to prevent water from siphoning from the pool below elevation 330 ft in the highly unlikely event that the line should break outside the pool."</i></p> <p>As described, anti-siphoning devices are installed on all SFP piping that could lead to siphoning; therefore, this criterion is met for Three Mile Island Nuclear Station, Unit 1.</p> <p>The normally locked-open anti-siphon valve (SF-V-48) was walked down as documented in Reference J. SF-V-48 is a 1-inch manual diaphragm valve confirmed to have adequate lateral support and seismic capacity for the GMRS spectral acceleration of Reference C in accordance with NP-6041, Table 2-4.</p> <p>As described, no anti-siphoning devices are attached to 2-inch or smaller piping with extremely large extended operators; therefore, this criterion is met for Three Mile Island Nuclear Station, Unit 1.</p>

SFP Criteria from EPRI 3002007148	Site-Specific Data
<p>7. To confirm applicability of the sloshing evaluation in Section 3.2 of EPRI 3002007148, the maximum SFP horizontal dimension (length or width) should be less than 125 ft, the SFP depth should be greater than 36 ft, and the GMRS peak Sa should be <0.1g at frequencies equal to or less than 0.3 Hz.</p>	<p>The Three Mile Island Nuclear Station, Unit 1 SFP has a length of 102.25-ft, a width of 24-ft and a depth of 43-ft as documented in Reference F; therefore, this criterion is met.</p> <p>The Three Mile Island Nuclear Station, Unit 1 GMRS maximum spectral acceleration in the frequency range less than 0.3 Hz is 0.0241g from Reference C (Table 2.4-1), which is less than 0.1g; therefore, this criterion is met.</p>
<p>8. To confirm applicability of the evaporation loss evaluation in Section 3.2 of EPRI 3002007148, the SFP surface area should be greater than 500 ft² and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>	<p>The surface area of the Three Mile Island Nuclear Station, Unit 1 SFP is 2,354-ft² [(102.25-ft x 24-ft) – ((24-ft -4-ft) x 5-ft)] (Reference F), which is greater than 500 ft²; and licensed reactor thermal power for Three Mile Island Nuclear Station, Unit 1 is 2,568 MWt (Reference H) which is less than 4,000 MWt per unit; therefore, these criteria are met.</p>

Attachment References:

- A. NRC Letter, Final Determination of Licensee Seismic Probabilistic Risk Assessments Under the Request for Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Recommendation 2.1 “Seismic” of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated October 27, 2015 (ML15194A015)
- B. NRC Letter, Endorsement of Electric Power Research Institute Report 3002007148, “Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation”, dated March 17, 2016 (ML15350A158)
- C. Exelon Generation Company, LLC Letter to USNRC, Seismic Hazard and Screening Report (Central and Eastern United States (CEUS) Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 31, 2014 (RS-14-073) (ML14090A271)
- D. NRC Letter to Exelon Generation Company, LLC, Three Mile Island Nuclear Station, Unit 1, Staff Assessment of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated August 14, 2015 (ML15223A215)
- E. Three Mile Island Unit 1, Updated Final Safety Analysis Report (UFSAR), Revision 23, April 2016
- F. Three Mile Island Unit 1, Drawing 421-117, “Fuel Storage Building – Concrete Walls – Elev. 329’-0” to Elev. 348’-0” and Floor Slab Elev. 348’-0”, Revision 7

- G. Three Mile Island Unit 1, Procedure ER-TM-450, "TMI Structures Monitoring Program", Revision 3
- H. Three Mile Island Nuclear Station, Unit 1, Renewed Facility Operating License No. DPR-50
- J. Exelon Generation Company, LLC's 180-day Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated November 19, 2012 (ML12362A044)