FENOC™
FirstEnergy Nuclear Operating Company

Perry Nuclear Power Plant
P O Box 97
10 Center Road
Perry, Ohio 44081

David B. Hamilton
Vice President

440-280-5382

November 22, 2016
L-16-295

10 CFR 50.54(f)

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

SUBJECT:
Perry Nuclear Power Plant
Docket No. 50-440, License No. NPF-58
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 (NTTF) Review of Insights from the Fukushima Dai-ichi Accident (CAC Nos. MF3729 and MF5261)

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 limited scope spent fuel pool (SFP) evaluations. By letter dated October 27, 2015 (Reference 2), the NRC transmitted final seismic information request tables, which identified that FirstEnergy Nuclear Operating Company (FENOC) is to conduct a limited scope SFP evaluation for Perry Nuclear Power Plant (PNPP). 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. This report supplements the guidance in the *Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic* (Reference 8) report 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 PNPP, and that the PNPP SFP is seismically adequate in accordance with NTTF 2.1 Seismic evaluation criteria.

The attachment to this letter provides the data for PNPP 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.

There are no new regulatory commitments contained in this letter and no revisions to existing regulatory commitments. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at 330-315-6810.

I declare under penalty of perjury that the foregoing is true and correct. Executed on November 22, 2016.

Respectfully,

David B. Hamilton

Attachment
Site-Specific Spent Fuel Pool Criteria for Perry Nuclear Power Plant

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, Agencywide Documents Access and Management System (ADAMS) Accession Number 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, ADAMS Accession Number ML15194A015.
3. NEI Letter, Request for Endorsement of *Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation (EPRI 3002007148)*, dated February 23, 2016, ADAMS Accession Number ML16055A017.
4. EPRI Report 3002007148, *Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation*, February 2016, ADAMS Accession Number ML16055A021.
5. NRC Letter, Endorsement of Electric Power Research Institute Report 3002007148, "Seismic Evaluation Guidance: Spent Fuel Pool Integrity Evaluation," dated March 17, 2016, ADAMS Accession Number ML15350A158.

6. FENOC Letter, FirstEnergy Nuclear Operating Company (FENOC) Seismic Hazard and Screening Report (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 (NTTF) Review of Insights from the Fukushima Dai-ichi Accident, dated March 31, 2014, ADAMS Accession Number ML14092A203.
7. NRC Letter, Perry Nuclear Power Plant, 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 (TAC No. MF3729), dated August 3, 2015, ADAMS Accession Number ML15208A034.
8. EPRI Report 1025287, *Seismic Evaluation Guidance, Screening, Prioritization and Implementation Details [SPID] for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic*, November 2012, ADAMS Accession Number ML12333A170.
9. FENOC Letter, FirstEnergy Nuclear Operating Company (FENOC) Expedited Seismic Evaluation Process (ESEP) Reports, Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force (NTTF) Review of Insights from the Fukushima Dai-ichi Accident, dated December 19, 2014, ADAMS Accession Number ML14353A059.
10. NRC Letter, Perry Nuclear Power Plant, Unit 1 - Staff Review of Interim Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 (TAC No. MF5261), dated September 23, 2015, ADAMS Accession Number ML15240A032.

cc: Director, Office of Nuclear Reactor Regulation (NRR)
NRC Region III Administrator
NRC Resident Inspector
NRR Project Manager

ATTACHMENT

FirstEnergy Nuclear Operating Company

Perry Nuclear Power Plant

Docket No. 50-440

License No. NPF-58

Site-Specific Spent Fuel Pool Criteria for Perry Nuclear Power Plant

The 50.54(f) letter (Reference 1) requested that, in conjunction with the response to 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 staff confirmed through References 2 and 7 that the GMRS exceeds the SSE and concluded that a SFP evaluation is merited for the FirstEnergy Nuclear Operating Company (FENOC, the licensee) Perry Nuclear Power Plant (PNPP). By letter dated March 17, 2016 (Reference 5), the 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 PNPP 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, initially reported in NTTF 2.1 Seismic Hazard and Screening Report for Perry Nuclear Power Plant Lake County, Ohio (March 31, 2014) (Reference 6), as accepted by the NRC in Perry Nuclear Power Plant, 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 (TAC No. MF3729), August 3, 2015 (Reference 7), and superseded by the Expedited Seismic Evaluation Process (ESEP) Reports (Reference 9) and accepted by the NRC in letter Perry Nuclear Power Plant, Unit 1 - Staff Review of Interim Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 (Reference 10), is 0.6g, which is ≤ 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 0.15g. The PNPP PGA is greater than 0.1g; therefore, this criterion is met.

SFP Criteria from EPRI 3002007148	Site-Specific Data
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 fuel pool at PNPP is located in the fuel handling building (FHB). The FHB is a three story reinforced concrete shear wall structure. The intermediate and fuel handling buildings are interconnected with the same mat foundation. The mat foundation is 9.5 ft. thick reinforced concrete and is on bedrock at elevation (EL) 565'. Part of the fuel handling building, at EL 620.5', is supported on piers. The piers that constitute the foundation have a diameter of 4.5 ft. and are socketed into rock, with their bottom at EL 559'. The length of these piers is about 57.5 ft. The fuel pool is constructed of reinforced concrete with steel liner plate, and at its base the walls are 5 ft. thick. The fuel pool rests directly on the foundation mat. The roof at EL 682.5' is supported by the steel girders, which are 5 ft. 8 in. deep. Therefore, this criterion is met for PNPP.
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 Structure Monitoring Program 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 PNPP.
Non-Structural Parameters	
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.	Numerous piping attached to the fuel pools have been identified. This piping is referenced on drawing 302-0655 (USAR Figure 9.1-9 Sheet 4). All piping is seismically qualified as discussed in the USAR Section 9.1.3.3. Therefore, this criterion is met for PNPP.

SFP Criteria from EPRI 3002007148	Site-Specific Data
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.	As identified on drawing 302-0655 (USAR Figure 9.1-9 Sheet 4), all lines that could lead to siphoning water from the SFP are connected to 1 in. siphon breakers. To limit the amount of water that could be drained from a pool area, siphon breakers are installed on each supply header branch. Siphon breakers are 1 in. lines that terminate a few inches below the pools surface. If siphoning action occurs due to a pipe rupture, the pool level would lower to the siphon breakers. When the water level reaches the siphon breakers, air will be drawn into the lines, preventing any further siphoning action from occurring. These siphon breakers are passive in nature and do not have operators. As described, anti-siphoning devices are installed on all SFP piping that could lead to siphoning; therefore, this criterion is met for PNPP. No anti-siphoning devices are attached to 2-in. or smaller piping with extremely large extended operators; therefore, this criterion is met for PNPP.
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.	The PNPP SFP is part of multiple interconnected pools, along with the fuel storage and preparation pool, the fuel transfer pool, and the cask pit pool. Combined, these pools have a length of less than 96 ft., a width that varies but is always less than 37 ft., and a depth of 44 ft. 8 in. based on drawings 101-0033, 301-0702, 302-0655 (USAR Figure 9.1-9 Sheet 4), and USAR Section 9.1.2.2.2; therefore, this criterion is met. The PNPP GMRS maximum spectral acceleration in the frequency range less than 0.3 Hz is 0.02g from the Expedited Seismic Evaluation Process (ESEP) Reports (Reference 9), which is less than 0.1g; therefore, this criterion is met.
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 ft^2 and the licensed reactor core thermal power should be less than 4,000 MWt per unit.	The PNPP SFP is part of multiple interconnected pools, along with the fuel storage and preparation pool, the fuel transfer pool, and the cask pit pool. The surface area of the PNPP SFP is 897 ft^2 (spent fuel pool only), and a total of 2,197 ft^2 combined for all interconnected pools, which is greater than 500 ft^2; and licensed reactor thermal power for PNPP is 3,758 MWt per unit, which is less than 4,000 MWt per unit; therefore, these criteria are met.