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10 CFR 50.4  
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ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Duke Energy Carolinas, LLC (Duke Energy)  
McGuire Nuclear Station (MNS), Units 1 and 2  
Docket Nos. 50-369 and 50-370  
Renewed License Nos. NPF-9 and NPF-17

**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, 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, transmits EPRI 3002007148 for NRC endorsement, dated February 23, 2016, ADAMS Accession Number ML16055A017.
4. EPRI 3002007148, Seismic Evaluation Guidance Spent Fuel Pool Integrity Evaluation, dated, February 2016, ADAMS Accession Number ML 16055A021.
5. NRC Letter, provides endorsement of EPRI 3002007148, dated March 17, 2016, ADAMS Accession Number ML15350A158.
6. Duke Energy Letter, Seismic Hazard and Screening Report (CEUS Sites), Response to NRC 10 CFR 50.54(f) 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 20, 2014, ADAMS Accession Number ML14098A421.

ADID  
NRR

7. NRC Letter, McGuire Nuclear Station, Units 1 and 2 - 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 July 20, 2015, ADAMS Accession Number ML15182A067.
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, dated February 15, 2013, ADAMS Accession Number ML12319A074.

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 Duke Energy's McGuire Nuclear Station 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. This report supplements the guidance in the 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 Duke Energy's McGuire Nuclear Station, and that the McGuire Nuclear Station SFP is seismically adequate in accordance with NTF 2.1 Seismic evaluation criteria.

The attachment to this letter provides the data for McGuire Nuclear Station 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 NTF Recommendation 2.1 Seismic evaluation criteria.

This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

Should you have any questions regarding this submittal, please contact George Murphy at 980-875-5715.

I declare under penalty of perjury that the foregoing is true and correct. Executed on August 18, 2016.

Sincerely,



Steven D. Capps

Attachment: Site-Specific Spent Fuel Pool Criteria for McGuire Nuclear Station

xc:

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**ATTACHMENT**

**Duke Energy**

**McGuire Nuclear Station (MNS), Units 1 and 2**

**Docket Nos. 50-369 and 50-370**

**Renewed License Nos. NPF-9 and NPF-17**

**Site-Specific Spent Fuel Pool Criteria for McGuire Nuclear Station**

# Site-Specific Spent Fuel Pool Criteria for McGuire Nuclear Station

The 50.54(f) letter 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 Duke Energy’s McGuire Nuclear Station. 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 McGuire Nuclear Station 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
<b>Site Parameters</b>	
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 6 as accepted by the NRC in Reference 7 is 0.676g, which is $\leq 0.8g$ ; therefore, this criterion is met.
<b>Structural Parameters</b>	
2. The structure housing the SFP should be designed using an SSE with peak ground acceleration (PGA) of at least 0.1g.	The SFP is housed in the Fuel Building (part of the Auxiliary Building structure), which is seismically designed to the site SSE with a PGA of 0.15g [Ref. McGuire UFSAR Section 3.1 and Reference 12]. The McGuire Nuclear Station 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 four foot thick concrete shear walls and with an integrated concrete frame [Ref. UFSAR Section 3.8.4.1.1, UFSAR Figures 3-104 through 3-107, and References 9 and 10]; therefore, this criterion is met for McGuire Nuclear Station.
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 McGuire Nuclear Station Civil Inspection 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 [Ref. UFSAR Section 18.2.17, UFSAR Table 18-1, and Reference 13]. Therefore, this criterion is met for McGuire Nuclear Station.

# Site-Specific Spent Fuel Pool Criteria for McGuire Nuclear Station

SFP Criteria from EPRI 3002007148	Site-Specific Data
<b>Non-Structural Parameters</b>	
<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 in accordance with McGuire's UFSAR Section 3.1 - Discussion for Generic Design Criteria 61, which assures "the spent fuel pool is designed such that no postulated accident could cause excessive loss of coolant inventory" as well as McGuire UFSAR Section 3.7 and Table 3-4 [See References 7.5 through 7.8 of MCC-1612.00-00-0001 for a complete list of relevant piping drawings which contain QA conditions of the piping sections], therefore, this criterion is met for McGuire Nuclear Station.</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>The McGuire Unit 1 and 2 SFP relies on passive design features to limit the amount of inventory which could be inadvertently drained [Ref. UFSAR Sections 9.1.3.1.3 and 9.1.3.3.2]. In general, the mechanical piping interfaces below the SFP normal water level are either equipped with siphon breakers, and/or the pipe elevation does not extend more than 2-4' below normal SFP water level. The potential for rapid drawdown on SFP inventory due to attached piping was examined in depth in McGuire calculation MCC-1612.00-00-0001, which was in response to the 10 CFR 50.54(f) request for information regarding the Fukushima Near-Term Task Force (NTTF) Recommendation 2.3 for Seismic Walkdowns [See References 7.5 through 7.8 of MCC-1612.00-00-0001 for a complete list of relevant piping drawings].</p> <p>As described, anti-siphoning devices are installed on all SFP piping that could lead to siphoning; therefore, this criterion is met for McGuire Nuclear Station.</p> <p>As described above, there are no anti-siphoning devices attached to 2-inch or smaller piping with extremely large extended operators. Therefore, this criterion is met for McGuire Nuclear Station.</p>
<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 &lt;0.1g at frequencies equal to or less than 0.3 Hz.</p>	<p>The McGuire Nuclear Station SFP has a length of 67 ft., a width of 21.5 ft. and a depth of 40 ft. based on McGuire's UFSAR Section 3.8.4.1.1 and References 9 and 10; therefore, this criterion is met.</p> <p>The McGuire Nuclear Station GMRS maximum spectral acceleration in the frequency range less than 0.3 Hz is 0.0326g from Reference 6, which is less than 0.1g; therefore, this criterion is met.</p>

# Site-Specific Spent Fuel Pool Criteria for McGuire Nuclear Station

SFP Criteria from EPRI 3002007148	Site-Specific Data
<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 ft<sup>2</sup> and the licensed reactor core thermal power should be less than 4,000 MWt per unit.</p>	<p>The surface area of the McGuire Nuclear Station SFP is 1087.6 ft<sup>2</sup> [Calculated based on References 9 and 10], which is greater than 500 ft<sup>2</sup>. Licensed reactor thermal power for McGuire Nuclear Station is 3469 MWt per unit [Ref. UFSAR Section 1.1], which is less than 4,000 MWt per unit; therefore, these criteria are met.</p>

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, ADAMS Accession Number ML12053A340.
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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 15, 2013, ADAMS Accession Number ML12319A074.
9. McGuire Drawings MC-1230-01.00 through MC-1230-09.00; Unit 1 Spent Fuel Pool Concrete and Reinforcing Drawings

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10. McGuire Drawings MC-1230-12.00 through MC-1230-20.00; Unit 2 Spent Fuel Pool Concrete and Reinforcing Drawings
11. McGuire Calculation MCC-1612.00-00-0001, Rev. 2; "10CFR50.54(f) Recommendation 2.3 Fukushima Near-Term Task Force (NTTF) Seismic Walkdown Inspections"
12. McGuire Specification MCS-1108.00-00-0002, Rev. 9; "Specification for the Response Spectra and Seismic Displacements for Category I Structures"
13. EDM-410, Rev. 17; "Inspection Program for Civil Engineering Structures and Components"