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10 CFR 50.4
10 CFR 50.54(f)

CNS-16-055

July 20, 2016

Attention: Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-001

Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station (CNS), Units 1 and 2
Docket Numbers 50-413 and 50-414
Renewed License Nos. NPF-35 and NPF-52

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 No. 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, February 2016
5. NRC Letter, provides endorsement of EPRI 3002007148, dated March 17, 2016, ADAMS Accession Number ML15350A158
6. Catawba Nuclear Station Letter, Seismic Hazard and Screening Report (CEUS Sites), Response to NRC 10 CFR 50.54(f) Request for Additional 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 31, 2014 (ADAMS Accession Number ML14099A184)

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7. NRC Letter, Catawba 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 Relating to Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident (TAC Nos. MF3965 and MF3966), dated April 27, 2015 (ADAMS Accession Number ML15096A513)
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

Ladies and Gentlemen:

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 Catawba 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 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 Catawba Nuclear Station and that the Catawba Nuclear Station SFP is seismically adequate in accordance with the Near-Term Task Force (NTTF) 2.1 Seismic evaluation criteria.

The attachment to this letter provides the data for Catawba 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 NTTF Recommendation 2.1 Seismic evaluation criteria.

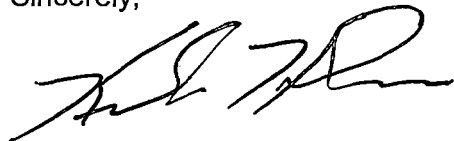
This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

Should you have any questions regarding this submittal, please contact Sherry Andrews at 803-701-3424.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on July 20, 2016.

Sincerely,

A handwritten signature in black ink, appearing to read 'KH Henderson', written over a white background.

Kelvin Henderson,
Vice President, Catawba Nuclear Station

Attachment: Site-Specific Spent Fuel Pool Criteria for Catawba Nuclear Station, Units 1 and 2

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ATTACHMENT

Duke Energy Carolinas, LLC (Duke Energy)

Catawba Nuclear Station, Units 1 and 2

Docket Numbers 50-413 and 50-414

Renewed License Numbers NPF-35 and NPF-52

**Site-Specific Spent Fuel Pool Criteria for Catawba Nuclear
Station, Units 1 and 2**

The 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 Spent Fuel Pool (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 Catawba Nuclear Station. By letter dated March 17, 2016 (Reference 5), the staff determined that the Electric Power Research Institute (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 Catawba 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
Site Parameters	
<p>1. The site-specific GMRS peak spectral acceleration at any frequency should be less than or equal to 0.8g.</p>	<p>The GMRS peak spectral acceleration in Catawba Nuclear Station Letter, Seismic Hazard and Screening Report (CEUS Sites), Response to NRC 10 CFR 50.54(f) Request for Additional 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 31, 2014 (ADAMS Accession Number ML14099A184) as accepted by the NRC in NRC Letter, Catawba 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 Relating to Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident (TAC Nos. MF3965 and MF3966), dated April 27, 2015 (ADAMS Accession Number ML15096A513) is 0.748g, which is $\leq 0.8g$. Therefore, this criterion is met for Catawba Nuclear Station.</p>

SFP Criteria from EPRI 3002007148	Site-Specific Data
Structural Parameters	
<p>2. The structure housing the SFP should be designed using an SSE with a peak ground acceleration (PGA) of at least 0.1g.</p>	<p>The SFP is housed in the Spent Fuel Pool Handling Building portion of the Auxiliary Building both of which are designed as Category I structures (Ref. CNS-1570.KF-00-0001 Rev. 21). Category I structures are seismically designed to the site SSE with a PGA of 0.15g (Ref. CNS UFSAR Sections 3.1, 3.2.1, 3.7.2, 3.8.4, and 9.1.2). The Catawba Nuclear Station PGA is greater than 0.1g. Therefore, this criterion is met for Catawba Nuclear Station.</p>
<p>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.</p>	<p>For both the Unit 1 and Unit 2 SFP, the Structural load path from the foundation to the SFP consists of a cast in place reinforced concrete structure founded on rock or fill concrete. The four foot thick concrete walls are rigidly connected to the 4 foot thick floor slab (Ref. CNS UFSAR Section 3.8.4.1 b). The location of the SFPs are shown on UFSAR Figures 1.4 through 1.7. Therefore, this criteria is met for Catawba Nuclear Station.</p>
<p>4. The SFP structure should be included in the Civil Inspection Program performed in accordance with Maintenance Rule.</p>	<p>The Spent Fuel Pool structures are monitored under EDM-410 Rev. 17 (Inspection Program for Civil Engineering Structures and Components) such that there is reasonable assurance that these SSCs are capable of fulfilling their intended functions. It is noted that EDM-410 is being replaced by a site specific procedure at each Duke Nuclear Station "AD-EG-CNS-1214" (Condition Monitoring of Structures). Both EDM-410 and AD-EG-CNS-1214 satisfy the requirements of 10 CFR 50.65. Therefore, this criterion is met for Catawba Nuclear Station.</p>
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>Cooling and make up piping attached to the SFP is designed to ASME Nuclear Safety Class 3 (Duke Class C) and seismic Category I standards (Ref. CNS-1570.KF-00-0001 Rev. 21). Therefore, this criterion is met for Catawba Nuclear Station.</p>

SFP Criteria from EPRI 3002007148	Site-Specific Data
<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>Catawba Nuclear Station, Unit 1 and Unit 2, each have passive features providing vacuum/anti-siphon protection at every Spent Fuel Cooling (KF) system piping interface with the Spent Fuel Pool. Neither of the two Spent Fuel Pools has an active device providing a vacuum breaker/anti-siphon function. The passive vacuum breaker/anti-siphon features at each interface with the Spent Fuel Pool are:</p> <ol style="list-style-type: none"> 1) The Spent Fuel Pool Cooling loop suction piping penetrates the pool wall and terminates within 2 to 4 feet below normal pool level (Ref. CN-1570-01.00 Rev. 26 and CN-2570-01.00 Rev. 17). 2) The Spent Fuel Pool Cooling loop discharge piping has a 0.5 inch diameter hole in the pipe wall located approximately 2 feet below normal pool level on both of the discharge return piping branches (Ref. CN-1570-01.00 Rev. 26 and CN-2570-01.00 Rev. 17). 3) The Spent Fuel Pool makeup header piping terminates 2 feet below normal pool level (Ref. CN-1570-01.00 Rev. 26 and CN-2570-01.00 Rev. 17). 4) The Spent Fuel Pool Skimmer loop suction piping penetrates the pool wall and terminates within 2 to 4 feet below normal pool level (Ref. CN-1570-01.00 Rev. 26 and CN-2570-01.00 Rev. 17). 5) The Spent Fuel Pool Skimmer discharge piping terminates 2 feet below normal pool level (Ref. CN-1570-01.00 Rev. 26 and CN-2570-01.00 Rev. 17). 6) The Standby Makeup Pump (RCP Alternate Seal Injection) suction supply is via piping connected to the fuel-transfer tube (Ref. CN-1570-01.00 Rev. 26 and CN-2570-01.00 Rev. 17). This is isolated procedurally via a manual isolation valve in the event of loss of spent fuel pool level (Ref. AP/1/A/5500/041 Rev. 11 and AP/2/A/5500/041 Rev. 13). <p>As described, anti-siphoning devices are installed on all SFP piping that could lead to siphoning. Therefore, this criterion is met for Catawba Nuclear Station.</p> <p>As documented 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 Catawba Nuclear Station.</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 SFP has a length of approximately 120 feet, a width of approximately 21.5 feet, and a depth of approximately 40 feet based on UFSAR Section 3.8.4.1. Therefore, this criterion is met for Catawba Nuclear Station.</p> <p>The Catawba Nuclear Station GMRS maximum spectral acceleration in the frequency range less than 0.3 Hz is 0.0344g from Catawba Nuclear Station Letter, Seismic Hazard and Screening Report (CEUS Sites), Response to NRC 10 CFR 50.54(f) Request for Additional 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 31, 2014 (ADAMS Accession Number ML14099A184) which is less than 0.1g. Therefore, this criterion is met for Catawba Nuclear Station.</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 Catawba Nuclear Station SFP is 2176 ft², excluding the fuel transfer canal area (Ref. CNC-1201.30-00-0010 Rev. 0), which is greater than 500 ft²; and licensed reactor thermal power for Catawba Nuclear Station is 3469 MWt for Unit 1 and 3411 MWt for Unit 2 which is less than 4,000 MWt per unit (Ref. latest issue of the Catawba Facility Operating License). Therefore, these criteria are met for Catawba Nuclear Station.</p>