



J. Ed Burchfield, Jr.  
Vice President  
Oconee Nuclear Station

Duke Energy  
ON01VP | 7800 Rochester Hwy  
Seneca, SC 29672

o: 864.873.3478  
f: 864.873.5791  
Ed.Burchfield@duke-energy.com

RA-18-0253

10 CFR 50.4

December 21, 2018

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Duke Energy Carolinas, LLC (Duke Energy)  
Oconee Nuclear Station (ONS), Units 1, 2, and 3  
Docket Numbers 50-269, 50-270, 50-287  
Renewed License Numbers DPR-38, DPR-47, DPR-55

**Subject:** NEI 12-06, Appendix H, Revision 4, H.4.5 Path 5: GMRS > 2 X SSE, Mitigating Strategies Assessment (MSA) report for the New Seismic Hazard Information

**References:**

1. NEI 12-06, Revision 4, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, dated December 2016 (ML16354B421)
2. JLD-ISG-2012-01, Revision 2, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events, dated February 2017, (ML17005A188)
3. 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 31, 2014 (ML14092A024)
4. NRC Letter to Duke Energy, *Oconee Nuclear Station, Units 1, 2, and 3 - 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 22, 2015 (ML15201A008)
5. EPRI 1025287, *Seismic Evaluation Guidance: Screening, Prioritization and Implementation Details (SPID) for the Resolution of Fukushima Near-Term Task Force Recommendation 2.1: Seismic, Report Number 1025287, Palo Alto, CA*, dated February, 2013

ADID  
NRR

6. Duke Energy Letter, *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*, dated December 4, 2017 (ML17348A075)
7. Duke Energy Letter, *Notification of Compliance with Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events" for Oconee Nuclear Station, Unit 1 and FLEX Final Integrated Plan (FIP) for Oconee Nuclear Station, Units 1, 2, and 3*, dated January 26, 2017 (ML17031A431)
8. NRC Letter to Duke Energy, *Oconee Nuclear Station, Units 1, 2, and 3 – Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051*, dated August 30, 2017 (ML17202U791)
9. Station calculation - Seismic MSA Path 5 Assessment

The purpose of this letter is to provide the results of the assessment for Oconee Nuclear Station (ONS), Units 1, 2, and 3, to demonstrate that Seismic Probabilistic Risk Assessment (SPRA) based alternate mitigating strategy (AMS) can be implemented considering the impacts of the reevaluated seismic hazard. The assessment was performed in accordance with the guidance provided in Appendix H of NEI 12-06 Revision 4 [Reference 1] which was endorsed by the NRC [Reference 2].

The Mitigating Strategies Seismic Hazard Information (MSSHI) is the licensee's reevaluated seismic hazard information at ONS, developed using Probabilistic Seismic Hazard Analysis (PSHA). In response to the NRC's 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, ONS submitted the reevaluated seismic hazard information, including the UHRS, GMRS and the hazard curves, to the NRC on March 31, 2014 [Reference 3]. The NRC staff concluded that the MSSHI that was submitted adequately characterizes the reevaluated seismic hazard for the site [Reference 4]. Further, ONS is submitting the updated SPRA to the NRC concurrently with this submittal.


The mitigating strategies for ONS, considering the reevaluated seismic hazard, will include a plant modification which will provide an alternate letdown isolation method which will achieve a seismic Large Early Release Frequency (SLERF) value below  $1 \times 10^{-6}$ /reactor-year based on sensitivity analysis.

This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments; however, it does contain a new planned action to provide an alternate letdown isolation method which will achieve a SLERF value below  $1 \times 10^{-6}$ /reactor-year based on sensitivity analysis.

RA-18-0253  
December 21, 2018

Should you have any questions regarding this submittal, please contact Laura Todd with Oconee Regulatory Affairs at (864) 873-6774.

Sincerely,



J. Ed Burchfield, Jr.  
Vice President  
Oconee Nuclear Station

Attachment: Mitigating Strategies Assessment for Oconee Nuclear Station, Units 1, 2, and 3

RA-18-0253  
December 21, 2018

cc w/attachment:

Ms. Catherine Haney, Regional Administrator  
U.S. Nuclear Regulatory Commission – Region II  
Marquis One Tower  
245 Peachtree Center Ave., NE Suite 1200  
Atlanta, Georgia 30303-1257

Mr. Ho Nieh, Director, Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852-2738

Ms. Audrey Klett, Project Manager  
(by electronic mail only)  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Mail Stop O-8G9A  
11555 Rockville Pike  
Rockville, Maryland 20852

Mr. Eddy Crowe  
NRC Senior Resident Inspector  
Oconee Nuclear Station

ATTACHMENT

Duke Energy Carolinas, LLC

Oconee Nuclear Station (ONS), Units 1, 2, and 3

Docket Numbers 50-269, 50-270, 50-287

Renewed License Numbers DPR-38, DPR-47, DPR-55

Mitigating Strategies Assessment for Oconee Nuclear Station

## **Mitigating Strategies Assessment**

The purpose of this Mitigating Strategies Assessment is to evaluate and demonstrate that Oconee Nuclear Station (ONS), Units 1, 2, and 3, can mitigate the effects of the reevaluated seismic hazard information developed pursuant to the NRC's 10 CFR 50.54(f) letter dated March 12, 2012. The assessment was performed in accordance with the guidance provided in Reference 1. Reference 1 discusses a method to develop an alternate mitigating strategy (AMS) to address the mitigating strategies seismic hazard information (MSSHI). Reference 2 provides an NRC staff position that the method described in Section H.4.5 of Reference 1 for an AMS is acceptable for mitigating a beyond-design-basis external event.

The risk-informed assessment described in H.4.5.3 of Reference 1 uses the SPRA to address the impacts of the MSSHI on the plant. Consistent with Section H.4.5.3 of Reference 1, the ONS SPRA, which is being submitted to the NRC for review concurrently with this MSA, has been peer reviewed in accordance with the expectations set forth in Reference 5 and reflects resolution of peer review findings.

The results of the SPRA for ONS are:  $3.18 \times 10^{-5}$ /yr. seismic core damage frequency (SCDF) and  $1.34 \times 10^{-5}$ /yr. seismic large early release frequency (SLERF). These results are less than  $5 \times 10^{-5}$ /yr. for SCDF but are not less than  $5 \times 10^{-6}$ /yr. for SLERF. Oconee will implement plant modifications as described in "Summary of Modifications" section of this submittal that will bring the SLERF below  $1 \times 10^{-6}$ /yr. Therefore, in accordance with H.4.5.3, the SPRA results demonstrate that mitigating strategies are reasonably protected for the MSSHI and an evaluation under H.4.5.2, H.4.5.4, or H.4.5.5 is not required.

## **Spent Fuel Pool Cooling Evaluation**

The evaluation of spent fuel pool (SFP) cooling for ONS was performed based on the initial conditions established in NEI 12-06 [Reference 1] for SFP cooling coping in the event of an Extended Loss of A/C Power (ELAP)/Loss of normal access to the Ultimate Heat Sink (LUHS). The evaluation also used the results of pool heat up analyses from the ELAP evaluation as input.

The FLEX strategy for SFP cooling utilizes SFP level monitoring and make-up capability as described in ONS FLEX Final Integrated Plan (FIP) [Reference 7]. SFP water level is monitored using wide-range spent fuel pool level indicating (SFPLI) instruments that were installed in accordance with NRC EA-12-051. The NRC's Safety Evaluation of the ONS FIP [Reference 8] concludes that ONS has developed guidance that, if implemented appropriately, should maintain or restore SFP cooling following an ELAP consistent with NEI 12-06 guidance.

SFP make-up capability is provided using the portable diesel-driven FLEX pump. The FLEX Pump is the same high-capacity pump deployed for the core cooling strategy and will already be in place when SFP makeup is required. The source of makeup water to the SFP is the Intake Canal. The primary connection strategy uses hoses connected from the FLEX pump discharge to permanently installed SFP fill lines. The alternate connection strategy uses flexible hose taken from the portable spray nozzle (Boggs box) at the pool deck to connect to the FLEX pump discharge. The alternate connection strategy will be deployed regardless of availability of the primary connection point, in-case the SFP area becomes inaccessible.

The permanently installed plant equipment relied on for the implementation of the SFP Cooling FLEX strategy has been designed and installed, or evaluated to remain functional, in accordance with the plant design basis to the SSE loading conditions. The spent fuel pool integrity evaluations demonstrated inherent margins of the spent fuel pool structure and interfacing plant equipment above the SSE to the GMRS level [Reference 6]. ONS's FLEX strategy for SFP cooling make-up water includes the use of a flexible hose from the discharge of the FLEX pump and evaluation of the permanently installed piping is not required. The SFPLI has been evaluated to be seismically robust for the GMRS [Reference 9].

The portable FLEX equipment availability, including its storage and deployment pathways, have been evaluated to be adequate for the GMRS loading conditions [Reference 9]. The primary and alternate deployment pathways credited for FLEX were evaluated for seismic stability and determined to be acceptable. The primary and alternate deployment pathways do not enter areas susceptible to seismic liquefaction [Reference 7]. ONS also has supplemental (non-credited) deployment paths that provide diversity in the haul pathways and a Caterpillar 924K loader that would be available to clear any potential debris or impediments to reestablish a haul path following a beyond-design-basis earthquake [Reference 7]. The 924K loader is stored in the onsite FLEX Storage Building (FSB) and is protected from external hazards. Portable equipment stored in the FSB has significant margin with respect to seismically-induced overturning, and mobile equipment does not need to be seismically restrained [Reference 7]. There is also sufficient space between portable equipment while stored in the FSB to alleviate concerns due to seismic interaction from sliding or rocking [Reference 7].

### **Summary of Modifications**

The mitigating strategies for ONS, considering the reevaluated seismic hazard, will include a plant modification which will provide an alternate letdown isolation method which will achieve a SLERF value below  $1 \times 10^{-6}$ /reactor-year based on sensitivity analysis. These modifications will be implemented for all 3 units by the end of 2022.