Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-17-140

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10 CFR 50.4

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

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License Nos. NPF-90 and NPF-96
NRC Docket Nos. 50-390 and 50-391

Subject: **Watts Bar Nuclear Plant, Units 1 and 2 - 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," 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," February 2017 (ML17005A188)

3. TVA letter to NRC, "Tennessee Valley Authority's 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 Review of Insights from the Fukushima Dai-ichi Accident," dated March 31, 2014 (ML14098A478)

4. TVA letter to NRC, "Seismic Probabilistic Risk Assessment for Watts Bar Nuclear Plant, Units 1 and 2 – Response to NRC Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated June 30, 2017 (ML17181A485)

5. NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 1 - Staff Assessment of Information provided Pursuant to Title 10 of the Code of Federal Regulations, 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 No. MF3769)," dated October 5, 2015 (ML15055A543)

6. NRC letter to TVA, "Watts Bar Nuclear Plant, Unit 2 - Staff Assessment of Information provided Pursuant to Title 10 of the Code of Federal Regulations, 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 No. MF3946)," dated October 5, 2015 (ML15111A377)

7. 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," dated November 2012 (ML12333A170)

8. TVA letter to NRC, "Spent Fuel Pool Evaluation Supplemental Report for Watts Bar Nuclear Plant, Units 1 and 2 – Response to NRC Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated December 22, 2016 (ML16357A578)

9. TVA letter to NRC, "Compliance Letter and Final Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Watts Bar Nuclear Plants (TAC Nos. MF0950 and MF1177)," dated March 12, 2015 (ML15072A116)

10. NRC letter to TVA, "Watts Bar Nuclear Plant, Units 1 and 2 – Safety Evaluation Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Instrumentation Related to Orders EA-12-049 and EA-12-051," dated March 27, 2015 (ML15078A193)

The purpose of this letter is to provide the results of the assessment for Watts Bar Nuclear Plant (WBN), Units 1 and 2, 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 in Reference 2.

The Mitigating Strategies Seismic Hazard Information (MSSHI) is the licensee's reevaluated seismic hazard information at WBN, 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, WBN submitted the reevaluated seismic hazard information including the uniform hazard response spectra (UHRS), ground motion response spectra (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 (References 5 and 6). Further, TVA submitted the WBN SPRA to NRC on June 30, 2017 (Reference 4).

The mitigating strategies assessment in the Enclosure concludes the mitigating strategies for WBN, considering the impacts of the reevaluated seismic hazard, can be implemented as designed.

This letter contains no new regulatory commitments.

If you have any questions regarding this submittal, please contact Russell Thompson at (423) 751-2567.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 21st day of December 2017.

Respectfully,

J. W. Shea
Vice President, Nuclear Regulatory Affairs & Support Services

Enclosure:

Watts Bar Nuclear Plant, Units 1 and 2, Seismic Mitigating Strategies Assessment

cc (Enclosure):

NRR Director - NRC Headquarters
NRO Director - NRC Headquarters
NRC Regional Administrator - Region II
NRC Project Manager - Watts Bar Nuclear Plant
NRC Senior Resident Inspector - Watts Bar Nuclear Plant

ENCLOSURE

Watts Bar Nuclear Plant, Units 1 and 2
Seismic Mitigating Strategies Assessment

Mitigating Strategies Assessment

The purpose of this Mitigating Strategies Assessment is to evaluate and demonstrate that Watts Bar Nuclear (WBN), Units 1 and 2, 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 NEI 12-06, Revision 4 (Reference 1). Reference 1 discusses a method to develop an alternate mitigating strategy (AMS) to address the mitigating strategies seismic hazard information (MSSHI). JLD-ISG-2012-01 (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 WBN base SPRA (Reference 3) was submitted to NRC for review and has been peer reviewed in accordance with the expectations set forth in Electric Power Research Institute (EPRI) industry guidance (Reference 4).

The results of the SPRA for WBN are: 2.6x10-6/yr. seismic core damage frequency (SCDF) and 1.7x10-6/yr. seismic large early release frequency (SLERF). These results are less than 5x10-5/yr. SCDF and 5x10-6/yr. SLERF, therefore in accordance with H.4.5.3, the base 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 of Reference 1 is not required.

Spent Fuel Pool Cooling Evaluation

The evaluation of spent fuel pool (SFP) cooling for WBN was performed based on the initial conditions established in 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 the WBN Final Integrated Plan (FIP) (Reference 6). SFP make-up capability is provided using the low pressure FLEX pumps to pressurize the Essential Raw Cooling Water (ERCW) headers which can then be used for makeup to the SFP. The source of makeup water is the Chickamauga reservoir. The primary SFP makeup flow method is from the ERCW header connections through a hose(s) to the SFP. The secondary SFP makeup method is the FLEX connection at the SFP Demineralized Water System makeup line. Supply to this FLEX connection could come from an available clean water source via transfer pump or an ERCW FLEX connection. This secondary makeup capability provides makeup control when the refueling floor is not accessible.

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 safe shutdown earthquake (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 5).

The portable FLEX equipment availability, including its storage and deployment pathways, needed to accomplish SFP cooling have subsequently been evaluated considering a site specific seismic event. Possible liquefaction along the FLEX deployment routes is mitigated through use of hauling equipment capable of handling a 9" terrain drop or rise (Reference 6).

The NRC has issued their Safety Evaluation of the WBN FIP (Reference 7) and concluded that WBN has developed guidance that, if implemented appropriately, should maintain or restore SFP cooling following an ELAP consistent with Reference 1 guidance as endorsed by Reference 2, and should adequately address the requirements of the order.

Conclusion

The mitigating strategies for WBN, considering the impacts of the reevaluated seismic hazard, can be implemented as designed without modification.

References

1. NEI 12-06, Revision 4, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," 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," February 2017 (ML17005A188)

3. TVA letter to NRC, "Seismic Probabilistic Risk Assessment for Watts Bar Nuclear Plant, Units 1 and 2 – Response to NRC Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated June 30, 2017 (ML17181A485)

4. 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," dated November 2012 (ML12333A170)

5. TVA letter to NRC, "Spent Fuel Pool Evaluation Supplemental Report for Watts Bar Nuclear Plant, Units 1 and 2 – Response to NRC Request for Information Pursuant to *Title 10 of the Code of Federal Regulations* 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated December 22, 2016 (ML16357A578)

6. TVA letter to NRC, "Compliance Letter and Final Integrated Plan in Response to the March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049) for Watts Bar Nuclear Plants (TAC Nos. MF0950 and MF1177)," dated March 12, 2015 (ML15072A116)

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