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October 11, 2017
L-17-222

10 CFR 50.54(f)

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

SUBJECT:
Beaver Valley Power Station, Unit Nos. 1 and 2
Docket No. 50-334, License No. DPR-66
Docket No. 50-412, License No. NPF-73
Nuclear Energy Institute (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 (CAC Nos. MF3726, MF3727)

The purpose of this letter is to provide the results of the assessment for Beaver Valley Power Station (BVPS), Unit Nos. 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 [Reference 2].

The Mitigating Strategies Seismic Hazard Information (MSSHI) is the licensee's reevaluated seismic hazard information at BVPS, Unit Nos. 1 and 2, 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, FirstEnergy Nuclear Operating Company (FENOC) submitted the reevaluated seismic hazard information for BVPS, Unit Nos. 1 and 2, including the uniform hazard response spectra (UHRS), ground motion response spectrum (GMRS), and the hazard curves to the NRC on March 31, 2014 in enclosure A of Reference 3 with response to request for additional information submitted on December 1, 2014 [Reference 4]. The NRC staff concluded that the MSSHI that was submitted adequately characterizes the reevaluated seismic hazard for the site [Reference 6]. Further, FENOC submitted the SPRA for BVPS, Unit Nos. 1 and 2, to the NRC by letter dated July 27, 2017 [Reference 5].

Based upon the mitigating strategies assessments for BVPS Unit No. 1 and BVPS Unit No. 2 (Attachments 1 and 2, respectively), the mitigating strategies for BVPS, considering the impacts of the reevaluated seismic hazard can be implemented as designed.

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 October 11, 2017.

Sincerely,

Richard D. Bologna

Attachments
1. Mitigating Strategies Assessment for Beaver Valley Power Station Unit No. 1
2. Mitigating Strategies Assessment for Beaver Valley Power Station Unit No. 2

References:
1. NEI Report 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 4, December 2016, Agencywide Documents Access and Management System (ADAMS) Accession Number ML16354B421.
2. NRC JLD-ISG-2012-01, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events, Revision 2, February 2017, ADAMS Accession Number ML17005A188.
3. 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.
4. FENOC Letter, Response to Request for Additional Information Associated with Near-Term Task Force (NTTF) Recommendation 2.1, Seismic Hazard and Screening Report (TAC Nos. MF3726 and MF3727), dated December 1, 2014, ADAMS Accession Number ML14335A482.
5. FENOC Letter, Seismic Probabilistic Risk Assessment, 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. MF3726, MF3727), dated July 27, 2017, ADAMS Accession Number ML17213A015.

6. NRC Letter, Beaver Valley Power Station, Unit Nos. 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 (TAC Nos. MF3726 and MF3727), dated October 5, 2015, ADAMS Accession Number ML15274A307.
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*, November 2012, ADAMS Accession Number ML12333A170.
8. FENOC 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 (NTTF) Review of Insights from the Fukushima Dai-ichi Accident (CAC Nos. MF3726, MF3727, MF5223, and MF5224), dated November 7, 2016, ADAMS Accession Number ML16312A311.
9. NRC Letter, Beaver Valley Power Station, Units 1 and 2 - Staff Review of Spent Fuel Pool Evaluation Associated with Reevaluated Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1 (CAC Nos. MF3726 and MF3727), dated January 6, 2017, ADAMS Accession Number ML16349A042.
10. FENOC Letter, Completion of Required Action by NRC Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (CAC No. MF0841), dated December 16, 2016, ADAMS Accession Number ML16351A277.
11. FirstEnergy Nuclear Operating Company, Beaver Valley Power Station Analysis Assessment, "Converting C1% HCLPFs to C10% Capacities," PRA-BV3-17-001-R00, dated March 14, 2017.
12. ABS Consulting/Rizzo Associates Report, "Seismic Walkdown of Beaver Valley Nuclear Power Station Unit 1," ABS 2734294-R-004/RIZZO R6 12-4735, Revision 2, dated August 3, 2016.
13. ABS Consulting/Rizzo Associates Report, "Seismic Walkdown of Beaver Valley Nuclear Power Station Unit 2," ABS 2734294-R-011/RIZZO R6 12-4736, Revision 2, dated June 20, 2016.

cc: Director, Office of Nuclear Reactor Regulation (NRR)
NRC Region I Administrator
NRC Resident Inspector
NRR Project Manager
Director BRP/DEP
Site BRP/DEP Representative

ATTACHMENT 1

FirstEnergy Nuclear Operating Company

Beaver Valley Power Station Unit No. 1

Docket No. 50-334

License No. DPR-66

Mitigating Strategies Assessment for Beaver Valley Power Station Unit No. 1

Mitigating Strategies Assessment

The purpose of this mitigating strategies assessment is to evaluate and demonstrate that BVPS Unit No. 1 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 BVPS Unit No. 1 base SPRA [Reference 5] has been submitted to the NRC for review and has been peer reviewed in accordance with the expectations set forth in Reference 7.

The results of the SPRA for BVPS Unit No. 1 are: 1.30×10^{-5}/yr. seismic core damage frequency (SCDF) and 6.14×10^{-7}/yr. seismic large early release frequency (SLERF). These results are less than 5×10^{-5}/yr. SCDF and 5×10^{-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 is not required.

Spent Fuel Pool Cooling Evaluation

The evaluation of spent fuel pool (SFP) cooling for BVPS Unit No. 1 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 the BVPS Final Integrated Plan (FIP) [Reference 10]. SFP make-up capability is provided using the portable FLEX Godwin HL100M diesel-driven pump taking suction through a portable flexible hose and discharging through a permanently installed FLEX make-up connection tie-in to the SFP emergency make-up piping or through a flexible hose directly to the SFP. Hoses are also routed to spray nozzles on the operating deck to spray the spent fuel if there is a large leak that prevents maintaining a water cover over the spent fuel. Gated wyes outside of the SFP building allow operators to choose spray, or either make-up path, without reentering the building. The source of make-up water is the refueling water storage tank (RWST) or the plant ultimate heat sink, the Ohio River.

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 a peak spectral acceleration of 0.8g [Reference 8]. The NRC staff concluded that the implementation of the SFP integrity evaluation that was submitted met the criteria of the SFP Evaluation Guidance Report [Reference 9]. Due to the FLEX strategies including make-up directly from the portable pump to the pool via a flexible hose, no additional evaluation of the permanently installed FLEX makeup connections and the SFP emergency make-up piping is required.

Furthermore, the FLEX storage building, the FLEX equipment, and transit paths have been evaluated to ensure availability of the FLEX SFP make-up strategy. The resulting $C_{10\%}$ capacities for the FLEX storage building, SFP make-up pump tie down, and RWST are greater than the GMRS, per Reference 11. The FLEX storage building fragility calculation also considers displacements around doors to ensure proper functioning, and the FLEX equipment calculation also evaluates the tie down of the vehicles needed to transport the pump, which are not the limiting case. The seismic walkdown report [Reference 12], specifically addresses the FLEX deployment paths and identified only three possible interaction concerns: the Unit 2 cooling tower, collapse of the transmission towers in the switchyard, and slope instability of a hill along the south deployment path. The collapse of the Unit 2 cooling tower only affects the primary deployment path, and thus the alternate deployment path is still available. The transmission towers were judged to not collapse under seismic loading due to review of seismic design documentation for a similar tower that is located adjacent to the Unit 1 RWST [Reference 12]. The slope instability would affect both deployment paths; however, $C_{10\%}$ capacity of this slope is greater than the GMRS [Reference 11]. Additionally, BVPS has the capability for debris removal to clear the deployment paths.

Summary of Modifications

No modifications or procedure changes were identified from the MSA.

ATTACHMENT 2

FirstEnergy Nuclear Operating Company

Beaver Valley Power Station Unit No. 2

Docket No. 50-412

License No. NPF-73

Mitigating Strategies Assessment for Beaver Valley Power Station Unit No. 2

Mitigating Strategies Assessment

The purpose of this mitigating strategies assessment is to evaluate and demonstrate that BVPS Unit No. 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 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 BVPS Unit No. 2 base SPRA [Reference 5] has been submitted to the NRC for review and has been peer reviewed in accordance with the expectations set forth in Reference 7.

The results of the SPRA for BVPS Unit No. 2 are: 8.78×10^{-6}/yr. seismic core damage frequency (SCDF) and 2.66×10^{-7}/yr. seismic large early release frequency (SLERF). These results are less than 5×10^{-5}/yr. SCDF and 5×10^{-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 is not required.

Spent Fuel Pool Cooling Evaluation

The evaluation of spent fuel pool (SFP) cooling for BVPS Unit No. 2 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 the BVPS Final Integrated Plan (FIP) [Reference 10]. SFP make-up capability is provided using the portable FLEX Godwin HL100M diesel-driven pump taking suction through a portable flexible hose and discharging through a permanently installed FLEX make-up connection tie-in to the SFP emergency make-up piping or through a flexible hose directly to the SFP. Hoses are also routed to spray nozzles on the operating deck to spray the spent fuel if there is a large leak that prevents maintaining a water cover over the spent fuel. Gated wyes outside of the SFP building allow operators to choose spray, or either makeup path, without reentering the building. The source of make-up water is the refueling water storage tank (RWST) or the plant ultimate heat sink, the Ohio River.

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