UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 22, 2018

Mr. Richard D. Bologna
Site Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
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Shippingport, PA 15077

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT (CAC NOS. MF7896 AND MF7897; EPID L-2016-JLD-0007)

Dear Mr. Bologna:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

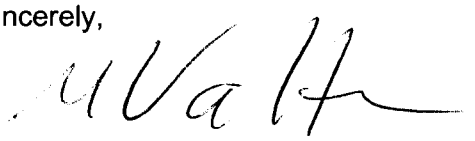
Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A046). Concurrent with the reevaluation of flood hazards, licensees were required to develop and implement mitigating strategies in accordance with NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). In order to proceed with implementation of Order EA-12-049, licensees used the current licensing basis flood hazard or the most recent flood hazard information, which may not be based on present-day methodologies and guidance, in the development of their mitigating strategies.

By letter dated September 20, 2017 (ADAMS Accession No. ML17263A122), FirstEnergy Nuclear Operating Company (the licensee) submitted the mitigation strategies assessment (MSA) for Beaver Valley Power Station, Units 1 and 2 (BVPS). The mitigation strategies assessments are intended to confirm that licensees have adequately addressed the reevaluated flooding hazard(s) within their mitigating strategies for beyond-design-basis external events. The purpose of this letter is to provide the NRC's assessment of the BVPS MSA.

The NRC staff has concluded that the BVPS MSA was performed consistent with the guidance described in Appendix G of NEI 12-06, Revision 2, as endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-01, Revision 1, and that the licensee has demonstrated that the mitigation strategies, if appropriately implemented, are reasonably protected from reevaluated flood hazards conditions for beyond-design-basis external events. This closes out the NRC's efforts associated with CAC Nos. MF7896 and MF7897.

If you have any questions, please contact me at 301-415-2864 or by via e-mail at Milton.Valentin@nrc.gov.

Sincerely,



Milton O. Valentin, Project Manager
Beyond-Design-Basis Management Branch
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Office of Nuclear Reactor Regulation

Enclosure:
Staff Assessment Related to the
Mitigating Strategies for BVPS

Docket Nos. 50-334 and 50-412

cc w/encl: Distribution via Listserv

STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE MITIGATION STRATEGIES FOR

BEAVER VALLEY POWER STATION, UNITS 1 AND 2

AS A RESULT OF THE REEVALUATED FLOODING HAZARDS REPORT

NEAR-TERM TASK FORCE RECOMMENDATION 2.1 - FLOODING

CAC NOS. MF7896 AND MF7897

1.0 INTRODUCTION

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML11186A950). Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses.

Concurrent with the reevaluation of flood hazards, licensees were required to develop and implement mitigating strategies in accordance with NRC Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). That order requires holders of operating reactor licenses and construction permits issued under 10 CFR Part 50 to modify the plants to provide additional capabilities and defense in depth for responding to beyond-design-basis external events, and to submit to the NRC for review a report, which is intended to describe how compliance with the requirements of Attachment 2 of the order would be achieved. In order to proceed with implementation of Order EA-12-049, licensees used the design basis flood hazard or the most recent flood hazard information, which may not be based on present-day methodologies and guidance, in the development of their mitigating strategies.

The NRC staff and industry recognized the difficulty in developing and implementing mitigating strategies before completing the reevaluation of flood hazards. The NRC staff described this issue and provided recommendations to the Commission on integrating these related activities in COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluat[i]on of Flood Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256). The Commission issued a staff requirements memorandum (SRM) on March 30, 2015 (ADAMS Accession No. ML15089A236), affirming that the Commission expects licensees for operating nuclear power plants to address the reevaluated flood hazards, which are considered beyond-design-basis external events, within their mitigating strategies.

Nuclear Energy Institute (NEI) 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," (ADAMS Accession No. ML16005A625) has been endorsed by

the NRC as an appropriate methodology for licensees to perform assessments of the mitigating strategies against the reevaluated flood hazards developed in response to the March 12, 2012, 50.54(f) letter. The guidance in NEI 12-06, Revision 2, and Appendix G in particular, supports the proposed Mitigation of Beyond-Design-Basis Events rulemaking. The NRC's endorsement of NEI 12-06, including exceptions, clarifications, and additions, is described in Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15357A163). Therefore, Appendix G of NEI 12-06, Revision 2, describes acceptable methods for demonstrating that the reevaluated flooding hazard is addressed within the Beaver Valley Power Station, Units 1 and 2 (BVPS, Beaver Valley) mitigating strategies for beyond-design-basis external events.

2.0 BACKGROUND

By letter dated February 22, 2017 (ADAMS Accession No. ML17040A011), the NRC issued an interim staff response (ISR) letter for BVPS. The ISR letter provided the reevaluated flood hazards that exceeded the design basis for BVPS and were suitable input for the mitigating strategies assessment (MSA) (i.e., the mitigating strategies flood hazard information (MSFHI) described in NEI 12-06). For BVPS, the mechanisms listed as not bounded by the design basis in the ISR letter are local intense precipitation (LIP) and probable maximum flood concurrent with wind wave action at the Ohio River (combined event flood or CEF).

By letter dated September 20, 2017 (ADAMS Accession No. ML17263A122), FirstEnergy Nuclear Operating Company (FENOC, the licensee) submitted the MSA for BVPS. The MSA is intended to confirm that FENOC has adequately addressed the reevaluated flooding hazards within its mitigating strategies for beyond-design-basis external events.

For LIP, the maximum water level elevation at certain doors is not bounded by the design basis. In its MSA, the licensee documented that, due to margin in the FLEX timeline and the availability of alternate deployment routes and staging locations, the mitigation strategies can be implemented without adverse consequences, with one exception. This exception can be resolved by installing a flood barrier to prevent internal flooding of the Unit 1 Fuel Building, which could affect safety-related functions. This would also involve a modification to the FLEX Supporting Guidelines (FSGs) associated with the implementation of the Unit 1 mitigating strategies during the reevaluated flood event.

For CEF, the reevaluated water elevation may require using alternate deployment paths and staging locations, which were already part of the BVPS mitigation strategies. For this reason, no changes were identified to address the reevaluated CEF mechanism.

3.0 TECHNICAL EVALUATION

3.1 Mitigating Strategies under Order EA-12-049

The NRC staff evaluated the BVPS mitigation strategies as developed and implemented under Order EA-12-049, as described in the BVPS final integrated plan (FIP) provided by FENOC in a letter dated December 16, 2016 (ADAMS Accession No. ML16351A277, non-publicly available). The NRC staff's safety evaluation for the BVPS FIP is dated May 18, 2017 (ADAMS Accession No. ML17095A276). The safety evaluation concluded that FENOC has developed guidance and proposed strategies that, if implemented appropriately, will adequately address the requirements of Order EA-12-049.

The BVPS units are Westinghouse pressurized-water reactors with dry ambient pressure containments. A brief summary of the licensee's FLEX strategies is as follows:

- For Phase 1, the heat sink for core cooling is provided by the steam generators (SGs), which would be fed simultaneously by the unit's turbine-driven auxiliary feedwater (TDAFW) pump with inventory initially supplied from the condensate storage tank. Steam release from the SGs to the atmosphere would be accomplished via the main steam safety valves or the atmospheric steam dump valves. Water makeup to the SGs is initially provided by the unit's TDAFW pump taking suction from the unit's primary plant demineralized water storage tank (PPDWST). The licensee estimated that the PPDWST water volume is sufficient to remove residual heat from the reactor for approximately nine hours. The reactor coolant system (RCS) makeup and boration will begin within 14 hours of the event initiation to ensure that natural circulation, reactivity control, and boron mixing are maintained in the RCS. Operators will perform a direct current bus load stripping within three hours following event initiation to ensure safety-related battery life is extended to 15 hours for Unit 1 and 17.75 hours for Unit 2. No actions are required during Phase 1 for spent fuel pool (SFP) makeup because the time to boil is sufficient to enable deployment of Phase 2 equipment. Adequate SFP inventory exists to provide radiation shielding for personnel well beyond the time of boiling. No actions are needed for either Phases 1 or 2 for containment because the licensee's calculations demonstrate that no actions are required to maintain containment pressure below design limits for over 72 hours.

- For Phase 2, and prior to depletion of the PPDWST, the demineralized water storage tank, if available, would be used to fill the PPDWST for approximately 48 hours. To provide an unlimited source of secondary makeup, FENOC will deploy FLEX makeup pumps to take suction from the Ohio River. The licensee has evaluated the use of river water and determined that it can be used to supply the SGs for at least 72 hours. In the event that the FLEX alternate auxiliary feed water (AFW) pump is required to backup the TDAFWP function, three portable diesel-driven pumps are available onsite in storage buildings. There are two FLEX storage locations at BVPS; the FLEX equipment storage building (FESB) and the Q-Laydown Warehouse, which houses the FLEX alternate AFW pump (considered spare, or N+1). The licensee stated that BVPS will use one portable 850 kW 480 Vac FLEX combustion turbine generator per unit. Operators will provide RCS makeup using FLEX RCS boration pumps, one per unit, to deliver water drawn from a FLEX connection on the boric acid tanks (two per unit). The Phase 2 strategy for SFP makeup uses a diesel-driven FLEX makeup pump with a suction from the unit's refueling water storage tank, the preferred source, or from the Ohio River. Ventilation is accomplished by opening the ground level Fuel Building rollup door and the upper level access door to establish a natural draft vent path.

- For Phase 3, the equipment from a National Strategic Alliance for FLEX Emergency Response (SAFER) Response Center (NSRC) will be transported to a staging area to continue the functions described above. During Phase 3, containment cooling and depressurization, as needed, can be accomplished through a variety of methods using installed and/or portable equipment. Equipment from the NSRC can be deployed by airlift or via ground transportation. Debris removal for the pathway between the site and the NSRC receiving staging areas may be required. However, the licensee's plans included alternate deployment routes and staging areas away from the reevaluated flood waters and the use of helicopters, as needed.

3.2 Evaluation of Current FLEX Strategies

The MSA was intended to confirm that licensees have adequately addressed the reevaluated flooding hazard(s) within their mitigating strategies for beyond-design-basis external events. The NRC staff reviewed the flood hazard elevation for the MSA, and confirmed that water elevations match the values in the site's ISR letter (ADAMS Accession No. ML17040A011). For BVPS, the reevaluated flood hazards not bounded by the design-basis are the LIP and the CEF. As explained by the licensee in its MSA, the LIP flooding mechanism could cause flooding of internal Unit 1 areas during the implementation of the strategies. To prevent the potential for internal flooding, the licensee proposed to install a removable flood barrier in a location used to support the Unit 1 SFP makeup strategy. Also, the FSGs associated with this strategy would have to be adjusted. The NRC staff evaluation of these modifications is provided in Sections 3.2.1.1, 3.2.2.1, and 3.3 of this assessment. For the CEF, the licensee stated that some deployment paths and staging locations could be affected. However, the original strategy already includes alternate pathways and staging locations. For that reason, FENOC did not propose modifications to address this flooding mechanism. The NRC staff evaluation of the licensee's approach to address the CEF can be found in Sections 3.2.1.2 and 3.2.2.2 of this assessment.

3.2.1 Evaluation of Flood Event Duration

The NRC staff reviewed the information provided by FENOC in its MSA (ADAMS Accession No. ML17263A122) regarding the flood event duration (FED) parameters needed to perform the MSA for flood hazards not bounded by the design basis. The evaluation of the FED parameters for the flood-causing mechanisms not bounded by the design basis are summarized in Table 3.2.1-1 and discussed by hazard mechanism in the following paragraphs.

3.2.1.1 Local Intense Precipitation

Flood scenario parameters 8, 9, 10, and 11 in Table 1 of the MSA provide the LIP FED values for BVPS. The licensee did not report a warning time for LIP-related flooding in its MSA. However, the NRC staff notes the licensee has the option to use NEI 15-05 (ADAMS Accession No. ML15110A080) to estimate warning time for LIP, as needed.

The NRC staff reviewed the licensee's LIP model during the review of the BVPS flood hazard reevaluation report (FHRR) (ADAMS Accession No. ML16063A288) and found that the estimation of the FED parameters, and the licensee's modeling, are acceptable for use in the MSA as they used present-day methodologies and regulatory guidance. The basis for the NRC staff's acceptance can be found in the NRC staff assessment for the FHRR, which will be published in a separate document.

In its MSA, the licensee stated that 12 door openings are inundated for various time periods ranging from 15 minutes to a maximum of 6 hours. For Unit 1, the licensee stated the maximum depth above the door openings was 0.4 feet (ft.), and for Unit 2 the maximum depth above the door openings was 0.5 ft. In its MSA, the licensee stated that there will be enough time to respond to the flood and that plant personnel will follow Abnormal Operating Procedure (AOP) 75.1, "Acts of Nature - Severe Weather." As part of this assessment, and following the generic audit plan dated December 5, 2016 (ADAMS Accession No. ML16259A189), the NRC staff reviewed AOP 75.1 to confirm that Attachment 3 for AOP 75.1 provides guidelines for when a severe weather watch or advisory is issued for Beaver County. These guidelines enable the BVPS site to prepare for weather events that could potentially evolve into a LIP.

In its MSA, FENOC explained that the BVPS FLEX strategies include sufficient margin and flexibility such that successful implementation is achievable with the increased flooding. As part of this assessment, the NRC staff referred back to the BVPS FIP to confirm that there are alternatives to consider in the event of a flood preventing the use of deployment routes and staging locations. Also, connection points for FLEX are inside safety-related structures and protected from the reevaluated flooding levels reported in the MSA.

However, the licensee identified the need to place a removable flood barrier during implementation of the Unit 1 SFP makeup strategy. The strategy states that the Unit 1 Fuel Building rollup door (1-F-35-2) would have to be open to provide ventilation. The assessment performed by FENOC concluded that the LIP will flood the outside of rollup door 1-F-35-2. If this rollup door is opened during the LIP, water would enter the Fuel Building and reach door 1-F-35-3, potentially affecting safety-related functions. In addition, FENOC stated in its MSA, that there will be minimal time to prepare for this action. To prevent internal flooding through door 1-F-35-3 due to the LIP, FENOC proposed the installation of a removable flood barrier (described in Engineering Change Package (ECP) 15-0357-003) and the revision of associated FSGs to include a requirement to install the flood barrier before opening rollup door 1-F-35-2. The licensee stated that these actions will be tracked in the site's corrective action program under Condition Report 2017-09202.

Following the audit plan, the NRC staff accessed Condition Report 2017-09202 to confirm that FENOC has an action to track the proposed changes in its corrective action program. Having the requirement for installing the barrier before opening rollup door 1-F-35-2 in the FSGs will prevent internal flooding. The NRC staff also audited ECP 15-0357-003, which includes the barrier design and installation details. The barrier is designed for simple installation and will be located next to door 1-F-35-3 for easy access. Based on the information provided by FENOC, the NRC staff concludes that installation of the flood barrier can be done in minimal time, as described in the MSA. If the installation is done before opening rollup door 1-F-35-2 as described by the licensee, the possibility of internal flooding in Unit 1 buildings will be mitigated.

3.2.1.2 Probable Maximum Flood with Wind Waves (CEF)

For the CEF mechanism, the licensee stated that the maximum water elevations were 732.8 ft. mean sea level (MSL) at the Unit 1 Turbine Building North Wall, 734 ft. MSL at the ground slope approaching the Unit 2 Reactor Building, and 734.5 ft. MSL at the ground slope approaching the Emergency Outfall Structure (EOS) and FESB. The NRC staff confirmed these values are consistent with the ISR letter (ADAMS Accession No. ML17040A011).

Also, the licensee stated that AOP 75.1 and AOP 75.2, "Acts of Nature - Flood," provide actions to take in the event of a severe thunderstorm warning for Beaver County. As part of this assessment, and following the December 5, 2016, generic audit plan, the NRC staff accessed AOP 75.1 and AOP 75.2 to confirm that FENOC has a comprehensive plan to address flooding at BVPS well before flood waters reach the power block. In addition, preventive measures in AOP 75.2 should prepare the site for any severe weather event, CEF included. The NRC staff previously assessed the BVPS flood protection measures, including AOP 75.2, as stated in the NRC staff assessment of the BVPS Walkdown Report (ADAMS Accession No. ML14156A233). For these reasons, and the diversity of pathways and staging locations, the NRC concludes that the CEF event should not prevent the implementation of the FLEX strategies.

In summary, the NRC staff determined that the licensee's approach for the FED parameters is acceptable and consistent with Appendix G of NEI 12-06, Revision 2 (ADAMS Accession No. ML16005A625).

3.2.2 Evaluation of Associated Effects

The NRC staff reviewed the information provided in FENOC's 50.54(f) response (ADAMS Accession No. ML16063A288) regarding the associated effect (AE) parameters needed to perform the additional assessments of plant response for flood hazards not bounded by the design basis. The AE parameters related to water surface elevation (i.e., stillwater elevation with wind waves and run-up effects) were previously reviewed by staff, and were transmitted to the licensee via an ISR letter. The AE parameters not directly associated with water surface elevation are discussed by hazard mechanism below and summarized in Table 3.2.2-1 of this assessment.

3.2.2.1 Local Intense Precipitation

For the LIP flood-causing mechanism, the licensee concluded in its MSA (ADAMS Accession No. ML17263A122), that the AE parameters related to water-borne loads, including hydrostatic, hydrodynamic, debris, and sediment loads, would induce minimal impacts to plant operations due to the low LIP water depths and velocities. The licensee also concluded that other AEs, including sediment deposition and erosion, concurrent site conditions, and effects on groundwater intrusion are inconsequential and not credible at the BVPS site.

As part of its review of the BVPS FHRR (ADAMS Accession No. ML16063A288), the NRC staff reviewed the LIP modeling and concluded that the modeling approach used present-day methodologies and regulatory guidance. This assessment will be available in a separate document. Correspondingly, the staff determined that the licensee's assessment of the AE parameters for the LIP flood-causing mechanism is acceptable for use in the MSA.

The NRC staff reviewed the information provided by the licensee in its MSA in relation to the site's topography, FLEX storage locations, deployment routes, staging locations, FLEX vehicles, and tools for deployment and debris removal. The NRC staff confirmed that both the FESB and Q-Laydown Warehouse should remain above reevaluated flood levels. Given that the strategies consider alternate routes, separate storage, staging locations, and because of the topography of the BVPS site, the NRC staff concludes that it is reasonable to expect minimal or no impact of LIP AE for staging and deployment of FLEX equipment.

To further assess the licensee's statements in its MSA, the NRC staff accessed FENOC Document NORM-LP-7121, "Beaver Valley Flooding Mitigation Strategy Assessment Support Document," as part of the audit described in letter dated December 5, 2016 (ADAMS Accession No. ML16259A189). Document NORM-LP-7121 provided sufficient details of the work done by FENOC when assessing the mitigation strategies against the reevaluated flood hazard for the MSA.

The NRC staff also assessed the LIP AE over the flood barrier proposed for door 1-F-35-3. Following the audit plan in letter dated December 5, 2016, the NRC staff accessed ECP 15-0357-003, which includes the design and installation details for the flood barrier. The NRC staff confirmed that the design of the barrier accounted for LIP AE such as hydrostatic and hydrodynamic loads. Also, the NRC staff confirmed that the reevaluated water levels and AE expected at this location should not challenge the barrier's protective function.

In summary, the NRC staff concluded that the licensee-provided AE parameters for the LIP flood-causing mechanism are acceptable and that the approach to estimate these parameters is consistent with the guideline provided by Appendix G of NEI 12-06, Revision 2 (ADAMS Accession No. ML16005A625).

3.2.2.2 Probable Maximum Flood with Wind Waves

The licensee stated that the wind-generated wave run-up at Unit 1 will not reach the safety-related structures due to the intervening topography. The same outcome is expected at Unit 2 due to the topography and several large obstructions. To confirm these statements, the NRC staff compared the door elevations of the safety-related structures at BVPS against the reevaluated CEF water levels. The comparison demonstrated that door elevations are above CEF water levels.

To better understand the analysis performed by the licensee, the NRC staff audited FENOC Calculation DSC-6799, "Coincident Wave Analysis." In this report, FENOC confirmed grade elevations of the BVPS site and surrounding areas to provide greater assurance of its analysis of the reevaluated flood levels. In essence the calculation evaluated the CEF effects at the BVPS site and surrounding areas used for site access. The NRC staff noticed that the calculation assumes no losses in direction or slope of the waves towards the site, which is considered conservative. Also, Calculation DSC-6799 explains that even if the smaller obstacles before the Unit 1 Turbine Building exterior wall, and the wall itself, were to be damaged by the waves, the building and all internals should remain as obstructions to the waves. Also, the calculation explains that, in a worst-case scenario, water may reach the internal wall between the Unit 1 Turbine Building and the Unit 1 Service Building. However, this internal wall is designed as a flood barrier and it has controls in place to mitigate adverse consequences from the waves. Other structures, including the FESB and the Q-Laydown Warehouse, were also considered in Calculation DSC-6799, and were found to be protected from wave runup by the site's topography. For these reasons, the NRC staff concludes that CEF AE should have minimal impact at the BVPS.

3.3 Evaluation of Modified FLEX Strategies

The staff reviewed the licensee's proposed modifications to address the potential for internal flooding in Unit 1 Buildings. The licensee stated that a flood barrier must be installed in door 1-F-35-3 before rollup door 1-F-35-2 is open to provide ventilation, as part of the Unit 1 SFP makeup strategy. Even when this modification is not considered a change to the strategies, it does add an extra step to consider when implementing the Unit 1 SFP makeup strategy. This extra step represents changes to pertinent FSGs.

As discussed in Section 3.2.1.1 of this assessment, FENOC will monitor the completion of these activities following the BVPS corrective action program under Condition Report 2017-09202. The licensee's MSA explained the intention to complete the necessary changes by the future required compliance date of the draft final mitigation of beyond-design-basis event rule, as it would be set by the Commission.

Based on this assessment, the staff finds that the proposed modifications are acceptable. The staff further concludes that, with the completion of the proposed changes in Condition Report 2017-09202, the licensee has demonstrated that the mitigation strategies, if appropriately implemented, are reasonably protected from reevaluated flood hazard conditions in accordance with the guidance found in Section G.4 of NEI 12-06, Revision 2.

4.0 AUDIT REPORT

The NRC staff previously issued a generic audit plan by letter dated December 5, 2016 (ADAMS Accession No. ML16259A189), that described the NRC staff's intention to conduct audits related to MSAs and issue an audit report that summarizes and documents the NRC's regulatory audit of the licensee's MSA. The NRC staff activities have been limited to performing the reviews described above. Because this staff assessment appropriately summarizes the results of those reviews, the NRC staff concludes that a separate audit summary report is not necessary, and that this document serves as the final audit report described in the December 5, 2016, letter.

5.0 CONCLUSION

The NRC staff has reviewed the information provided in the BVPS MSA related to current FLEX strategies, as evaluated against the reevaluated flood hazard(s) described in Section 2 of this staff assessment, and found that:

- impacts to the FLEX strategies have been adequately identified;
- the completion of actions in Condition Report 2017-09202 should mitigate the adverse effects of internal flooding during implementation of the mitigation strategies; and
- the licensee has provided an adequate description and justification of flood protection features necessary to implement the FLEX strategy to account for the reevaluated LIP and CEF flood hazards.

Therefore, the NRC staff concludes that the licensee has demonstrated the capability to deploy FLEX strategies against a postulated beyond-design-basis event for the LIP and CEF flood-causing mechanisms, including AEs and FED, as requested in the COMSECY-14-0037, and affirmed in the corresponding SRM. The NRC staff has reviewed the information presented in the MSA by FENOC for BVPS. The NRC staff confirmed that the licensee's flood hazard MSA was performed consistent with the guidance in Appendix G of NEI 12-06, Revision 2, as endorsed by JLD-ISG-2012-01, Revision 1. Based on the licensee's appropriate hazard characterization, methodology used in the MSA evaluation, and the description of its FLEX strategies; the staff concludes that the licensee has demonstrated that the mitigation strategies, if appropriately implemented, are reasonably protected from reevaluated flood hazard conditions.

Table 3.2.1-1. Flood Event Durations for Flood-Causing Mechanisms Not Bounded by the Design Basis

Flood-Causing Mechanism	Time Available for Preparation for Flood Event	Duration of Inundation of Site	Time for Water to Recede from Site
Local Intense Precipitation and Associated Drainage	Not Required	>6 hours	Minimal
PMF[1] + Wind waves (CEF)	78 Hours	74 hours	30 hours

Source: MSA (ADAMS Accession No. ML17263A122)

1 Probable Maximum Flood (PMF)

TABLE 3.2.2-1. ASSOCIATED EFFECTS PARAMETERS NOT DIRECTLY ASSOCIATED WITH TOTAL WATER HEIGHT FOR FLOOD-CAUSING MECHANISMS NOT BOUNDED BY THE DESIGN BASIS.[1]

Associated Effects Factor	Local Intense Precipitation	PMF + Wind Wave (CEF)
Hydrodynamic loading at plant grade	No Impact Identified	No Impact Identified
Debris loading at plant grade	Minimal	Minimal
Sediment loading at plant grade	Minimal	Minimal
Sediment deposition and erosion	Minimal	Minimal
Concurrent Conditions, including adverse weather	None	50 mile-per-hour Winds
Groundwater ingress	Minimal	No impact identified
Other pertinent factors (e.g., waterborne projectiles)	None	Minimal

Source: MSA (ADAMS Accession No. ML17263A122)

SUBJECT: BEAVER VALLEY POWER STATION, UNITS 1 AND 2 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT (CAC NOS. MF7896 AND MF7897; EPID L-2016-JLD-0007) DATED March 22, 2018

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ADAMS Accession No.: ML18071A169 ***concurrence via e-mail**

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DATE	3/12/18	3/14/18	2/1/18	2/1/18
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