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

April 12, 2017

Mr. Brian D. Boles
Site Vice President
FirstEnergy Nuclear Operating
Company
c/o Davis-Besse NPS
5501 N. State Route 2
Oak Harbor, OH 43449-9760

SUBJECT: DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT (CAC NO. MF7918)

Dear Mr. Boles:

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, pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.54(f), "Conditions of Licenses" (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 report (ADAMS Accession No. ML111861807).

Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their site(s) 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). 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 have been based on present-day methodologies and guidance, in the development of their mitigating strategies.

By letter dated December 12, 2016 (ADAMS Accession No. ML16348A010), FirstEnergy Nuclear Operating Company (FENOC, the licensee) submitted the flooding mitigation strategies assessment (MSA) for Davis-Besse Nuclear Power Station, Unit 1 (Davis-Besse). The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events. The purpose of this letter is to provide the NRC's assessment of the Davis-Besse MSA.

The NRC staff has concluded that the Davis-Besse MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute 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 are reasonably protected from reevaluated flood hazards conditions for beyond-design-basis external events. This closes out the NRC's efforts associated with CAC No. MF7918.

If you have any questions, please contact me at 301-415-3809 or at Juan.Uribe@nrc.gov

Sincerely,

Juan Uribe, Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:
Staff Assessment Related to the
Mitigating Strategies for Davis-Besse

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED TO MITIGATION STRATEGIES FOR DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1 AS A RESULT OF THE REEVALUATED FLOODING HAZARD NEAR-TERM TASK FORCE RECOMMENDATION 2.1 – FLOODING (CAC NO. MF7918)

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, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), "Conditions of Licenses" (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 respective site(s) 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 final integrated plan that describes how compliance with the requirements of Attachment 2 of the order was achieved. 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 have been 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 Reevaluation of Flood Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256). The Commission issued a staff requirements memorandum 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). As discussed in JLD-ISG-2012-01, Appendix G of NEI 12-06, Revision 2, describes acceptable methods for demonstrating that the reevaluated flooding hazard is addressed within the Davis-Besse Nuclear Power Station, Unit 1 (Davis-Besse), mitigating strategies for beyond-design-basis external events.

2.0 BACKGROUND

By letter dated September 3, 2015 (ADAMS Accession No. ML15239B212), the NRC issued an interim staff response (ISR) letter for Davis-Besse. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the current design basis (CDB) for Davis-Besse, which were to be used in conducting the mitigating strategies assessment (MSA), as described in NEI 12-06. For Davis-Besse, the mechanisms listed as not bounded by the CDB in the ISR letter are local intense precipitation (LIP) and probable maximum storm surge (PMSS). By letter dated December 14, 2016 (ADAMS Accession No. ML16323A236), the NRC issued a staff assessment, which provided the documentation supporting the NRC staff's conclusions summarized in the ISR letter.

By letter dated December 12, 2016 (ADAMS Accession No. ML16348A010), FirstEnergy Nuclear Operating Company (FENOC, the licensee) submitted the Davis-Besse MSA for review by the NRC staff.

3.0 TECHNICAL EVALUATION

3.1 Mitigating Strategies under Order EA-12-049

By letter dated February 27, 2013 (ADAMS Accession No. ML13064A243), FENOC submitted its Overall Integrated Plan (OIP) for Davis-Besse, in response to Order EA-12-049. At 6 month intervals following the submittal of the OIP, the licensee submitted reports on its progress in complying with Order EA-12-049. By letter dated August 28, 2013 (ADAMS Accession No. ML13234A503), the NRC notified all licensees and construction permit holders that the staff is conducting audits of their responses to Order EA-12-049 in accordance with NRC Office of Nuclear Reactor Regulation (NRR) Office Instruction LIC-111, "Regulatory Audits" (ADAMS Accession No. ML082900195). By letters dated February 21, 2014 (ADAMS Accession No. ML14007A670), and February 8, 2016 (ADAMS Accession No. ML16019A367), the NRC issued an Interim Staff Evaluation (ISE) and audit report, respectively, on the licensee's progress. By letter dated September 23, 2016 (ADAMS Accession No. ML16267A471), FENOC submitted a compliance letter and Final Integrated Plan (FIP) in response to Order EA-12-049. The compliance letter stated that the licensee had achieved full compliance with Order EA-12-049.

By letter dated January 31, 2017 (ADAMS Accession No. ML17017A340), the NRC staff issued a safety evaluation documenting the results of the NRC staffs review of the FLEX strategies for Davis-Besse. The safety evaluation concluded that the integrated plans, if implemented as described, should adequately address the requirements of Order EA-12-049.

A brief summary of Davis-Besse's FLEX strategies are listed below:

- During removal of decay heat, the makeup water to the steam generators (SG) is initially provided by the turbine-driven auxiliary feedwater (TDAFW) pumps taking suction from the condensate storage tanks (CSTs), if available. The CSTs are not seismically

qualified or missile protected. If the CSTs are not available, makeup to the SGs is provided by manually starting, from the control room, the diesel driven emergency feedwater pump (EFWP), which takes suction from the emergency feedwater storage tank (EFWST).

- Operators can transition the SG water supply from the TDAFW pumps or the emergency feedwater (EFW) pump to portable FLEX pumps using water from the EFWST. The FIP described various alternative water sources that are available to refill the EFWST including the ultimate heat sink, which is Lake Erie.

- The operators will complete direct current (dc) bus load stripping within 1 hour following event initiation to ensure safety-related battery life is extended up to 14.6 hours. Following dc load stripping and prior to battery depletion, the 850-kilowatt (kW), 480 volt alternating current (Vac) diesel generator (DG) that is pre-staged in the emergency feedwater facility (EFWF) will be connected to a motor control center (MCC) in the EFWF.

- To maintain spent fuel pool (SFP) cooling capabilities, makeup to the SFP can be gravity-fed from the borated water storage tank (BWST), if available. The BWST is not protected from high winds or tornado hazards. If the BWST is not available, SFP makeup can be provided from the EFWST using the EFWP, through connections, to supply the FLEX SFP makeup header.

- For Phases 1 and 2, no actions are required to maintain containment pressure below design limits and no actions or systems are needed to ensure continued containment function for Modes 1 through 4. Containment pressure and temperature both remain acceptable, at relatively low values, without any active containment cooling. For Modes 5 and 6, containment is vented to the atmosphere through the Emergency Hatch.

- During Phase 3, the National Strategic Alliance for FLEX Emergency Response (SAFER) Response Center (NSRC) will provide high capacity pumps and large turbine-driven DGs. Containment cooling and depressurization, as needed, would be accomplished by operating containment cooling fans, with service water (SW) for cooling supplied by an NSRC FLEX pump. The containment cooling fans would be powered by a DG supplied by the NSRC.

3.2. Evaluation of Current FLEX Strategies Against Reevaluated Hazard(s)

The licensee has assessed the potential impacts of the LIP and PMSS flood-causing mechanisms, as described in the ISR letter, against the mitigating strategies designed to meet Order EA-12-049. The purpose of the MSA was to determine if the licensee's mitigating strategies are adequate as-is, need to be modified, or new mitigating strategies need to be developed to address hazard exceedances as described in the ISR letter.

The licensee described in its MSA that implementation of the FLEX strategies at Davis-Besse is divided into three phases. In general, the first phase is to initially cope by relying on installed plant equipment, the second phase is to transition from installed plant equipment to the on-site FLEX equipment, and the third phase is to obtain additional capability and redundancy from off-site equipment. In addition, the FLEX equipment used during these phases is classified in two categories. The first category is FLEX "N" equipment, which is equipment that is protected from

all beyond design-basis external event (BDBEE) hazards and is the primary FLEX response equipment, and the second category is FLEX "N+1" equipment, which is equipment that may not be protected from all BDBEE hazards and is used as an alternate to FLEX "N" equipment. Overall, the licensee determined in its evaluation that LIP and PMSS challenge the implementation of FLEX strategies as previously designed, and as a result, need to be modified in order to account for the reevaluated hazard.

For LIP, the NRC confirmed in the ISR letter that the maximum reevaluated-flood stillwater elevation at the turbine building, intake structure, and auxiliary buildings is 585.5 ft, 585.5 ft, and 585.4 ft, respectively. The NRC staff also confirmed that waves and runup at these locations are minimal, and therefore can be neglected. In its MSA submittal, the licensee stated that flooding levels develop a depth above critical door sills for a period of 0.5 hours. The licensee stated in its MSA that FLEX equipment has sufficient margin such that Phase 1 and 2 strategies, as well as all FLEX "N" equipment, are not challenged by a reevaluated LIP hazard event. The main reason for the availability of all FLEX "N" equipment is that the emergency feedwater facility and the auxiliary building, which house this equipment, are not impacted by LIP. However, the evaluation determined that the Phase 3 strategy staging areas and the FLEX "N+1" deployment path were impacted. As a result, minor modifications to the FLEX strategy were determined to be required.

For the Phase 3 strategy, the licensee performed an evaluation and identified alternate staging areas that were verified to be available during a LIP event in order to support receipt of Phase 3 equipment. For the affected FLEX "N+1" equipment, the licensee stated in its MSA that it plans to develop a trigger point that allows for pre-deployment of FLEX "N+1" equipment prior to the flooding of the deployment path. The licensee also stated that development of the trigger points and alternate staging areas have been entered into and are being tracked within the FENOC corrective action program.

For PMSS, the NRC confirmed in the ISR letter that the maximum reevaluated-flood stillwater elevation is 585.8 ft. With the addition of waves and runup, the hazard elevation is 585.9 ft. In its MSA submittal, the licensee stated that flooding levels impact critical station doors above 585 ft for a period of 2.5 hours. The licensee stated that FLEX equipment has sufficient margin such that Phase 1 and 2 strategies, as well as all FLEX "N" equipment are not challenged by a reevaluated PMSS hazard event. The main reason for the availability of all FLEX "N" equipment is that the emergency feedwater facility and the auxiliary building, which house the equipment, are not impacted by PMSS. However, the evaluation determined that the Phase 3 strategy staging areas and the FLEX "N+1" deployment path were impacted. As a result, minor modifications to the FLEX strategy were determined to be required. The depth and duration of the standing water as a result of PMSS is greater than the impacts caused by a LIP event.

Similar to LIP, the licensee stated in its MSA that it had performed an evaluation and identified alternate staging areas that were verified to be available during a PMSS event in order to support receipt of Phase 3 equipment. For the affected FLEX "N+1" equipment, the licensee plans to develop a trigger point that allows for pre-deployment of FLEX "N+1" equipment prior to the flooding of the deployment path. The licensee stated in its MSA that development of the trigger points and alternate staging areas have been entered into and are being tracked within the FENOC corrective action program.

The NRC staff has reviewed the information presented in the MSA, as well as supporting documentation, as applicable. This included:

- Review of licensing documents;
- Review of the topographical features of the site; and
- Review and documentation of existing mitigating strategies under Order EA-12-049.

The NRC staff reviewed the flood hazard elevations in the MSA and confirmed that the elevations match the values provided in the Davis-Besse ISR letter. The staff also reviewed the information related to the potential impacts of LIP and PMSS at the Davis-Besse site. During the review, the staff determined that additional information was necessary in order to complete its evaluation.

By letter dated December 5, 2016 (ADAMS Accession No. ML16259A189), the NRC staff had issued a generic audit plan to perform regulatory audits of licensees' MSAs on an as-needed basis, in order to support the NRC staff's review of the MSAs and issuance of the associated NRC staff assessments. As a result, this was the mechanism used to exchange information with FENOC for Davis-Besse, consistent with NRR LIC-111.

In regards to LIP and PMSS, the NRC staff requested additional information related to the alternate staging areas selected by FENOC to be used for Phase 3 equipment under a reevaluated flood event. Specifically, the NRC staff requested FENOC to provide additional information related to spatial location(s), elevations, diagrams, and/or calculations that could support the statements contained in the MSA.

In its response, the licensee stated that during the development of the MSA, additional feasibility evaluations of haul paths were performed that considered key flooding parameters (duration, depth, etc.) and ultimately determined three alternate locations. These evaluations are included as part of FENOC document NORM-LP-7221. As part of the audit response, an updated plant layout that included spatial locations of the alternate staging areas was provided. In summary, alternate staging area location 1 is located northwest of the switchyard and southwest of the cooling tower, alternate staging area 2 is located northeast of the auxiliary building and north of the intake structure, and alternate staging area location 3 is located south of the switchyard, to the east of the main parking lot.

For LIP, the evaluation indicated that all three staging areas would be slightly flooded, but Phase 3 activities have sufficient margin (as stated in Section 3.1 of this document), which would allow the flood waters to recede prior to implementation of the FLEX strategies. For PMSS, alternate staging area 1 is expected to be flooded and not available; however, areas 2 and 3 are considered to be "essentially dry" as part of the evaluation.

In regards to LIP and PMSS, the NRC staff also requested additional information on the proposed completion schedule for the development of trigger points that allows for pre-deployment of FLEX "N+1" equipment prior to the flooding of the deployment path. In its response, the licensee stated that the time required for deployment of the "N+1" equipment is approximately 2 hours. As such, FENOC stated that the warning time will be established so that a corporate meteorologist will notify the control room allowing sufficient time to mobilize and deploy the equipment to a staging area unaffected by a LIP or PMSS event. This activity is being tracked in the FENOC corrective action program (CR 2016-14090) and is expected to be completed by the end of 2017. The NRC staff did not have additional questions related to this topic.

The NRC staff also requested information related to the operational availability of Phase 1 and 2 equipment prior to the need of Phase 3 equipment under a reevaluated hazard scenario.

Specifically, the NRC staff sought to better understand the length of time that Phase 1 and 2 strategy equipment/components can continuously operate prior to the arrival of NSRC equipment. In its response, the licensee stated that Phase 1 and 2 equipment can operate beyond the period of concern for a reevaluated LIP and PMSS event, given that the event does not challenge the CSTs, the EFWST, and does not challenge fuel deployment paths for "N" equipment. Phase 1 and 2 equipment can drive the plant to the low end of Mode 3 and remain in this condition well beyond the period of concern by utilizing FLEX equipment, as well as existing water and fuel inventory replenishment strategies. The NRC staff did not have additional questions related to this topic.

Based on the review of the above information, the NRC staff concludes that FENOC has adequately assessed the Mitigating Strategies Flood Hazard Information for the LIP and PMSS events at Davis-Besse, and that the existing FLEX strategies, modified as described and if appropriately implemented, appear to be reasonably protected from the reevaluated flood hazards conditions.

3.3 Evaluation of Flood Event Duration

The staff reviewed the information provided by Davis-Besse in the flood hazard reevaluation report (FHRR) (ADAMS Accession No. ML15057A023), ISR and MSA submittals regarding the flood event duration (FED) parameters needed to perform the MSA for flood hazards not bounded by the CDB at the Davis-Besse. The FED parameters for the flood-causing mechanisms not bounded by the CDB are summarized in Table 3.3-1.

3.3.1. Local Intense Precipitation

The licensee reported in its MSA that procedures applicable to the Davis-Besse site were to be implemented when certain impending meteorological conditions were anticipated, such as a synoptic storm. The NRC staff notes that the National Weather Service typically provides qualitative precipitation forecasts of 24 hrs for synoptic storms.

The maximum water surface elevations (WSEs) generated during the LIP event in excess of the CDB were described at 12 locations for three structures within the Davis-Besse powerblock (specifically the Turbine building, Auxiliary building, and Service Water Intake Structure) are described in the Table 1 of the Davis-Besse FHRR. For the purposes of Table 2 of the ISR letter, only the maxima WSEs associated with each of the three structures in question were reported. As described in the FHRR, depending on the structure and location, the duration of inundation ranges from 24 minutes (min) to about 54 min. The licensee reported in its MSA that the time necessary for flood waters to recede from the site would be no more than 1 hr. regardless of the structure or location in question.

The licensee used results from a 2-dimensional numerical model, as described in the FHRR, to determine the inundation and recession durations. The staff confirmed that the licensee's reevaluation of the flood event duration parameters for LIP and associated drainage uses present-day methodologies and regulatory guidance.

3.3.2 Storm Surge

As mentioned above, the licensee identified an AOP that was to be implemented when impending flooding conditions at the Davis-Besse site were anticipated due a meteorological event capable of inducing flooding at the reactor site; this procedure is also applicable to any PMSS that would occur. In its MSA, the licensee described the PMSS applicable to the Davis-Besse site as a short-term, low-velocity event. The preparation time for a PMSS flooding event was reported as 1 hr.

The licensee also reported that the duration of flooding due to storm surge is on the order of 2.5 hrs, and the time for flood waters to recede from the controlled area range from 14 to 44 hrs depending on the location and its topography. Based on a review of the literature, as well as the modeling results, the staff concluded that the licensee's storm surge modeling is acceptable and the assumptions are reasonable for use as part of the MSA review.

3.4 Evaluation of Associated Effects

The staff reviewed the information provided by Davis-Besse in the FHRR, ISR, and MSA submittals regarding associated effects (AE) parameters for flood hazards not bounded by the CDB. The AE parameters related to water surface elevation (i.e., stillwater elevation with wind waves and runup effects) were previously reviewed by staff, and were transmitted to the licensee via the ISR letter. The AE parameters not directly associated with water surface elevation are discussed below and are summarized in Table 3.4-1.

For the LIP event, the licensee stated that the associated effects of LIP flooding were considered minimal due to the relative low flow velocities and limited debris effects within the protected area. The staff confirmed this statement by reviewing the licensee-provided LIP model input and output files. The staff found that the estimated inundation depths and flow velocities are acceptable and that the modeling is reasonable for use in the MSA. The staff agrees with the licensee's conclusion that the AE parameters for LIP are either minimal or no impact on the safety-related plant structures.

The staff reviewed the licensee's calculation of the debris load and maximum velocity applied to the debris. The staff noted that the licensee's assumption of a tree-log debris meets the guidelines by American Society of Civil Engineers (ACSE), "Minimum Design Loads for Buildings and Other Structures," ASCE Standard ASCE/SEI 7-10, with the following characteristics: 1,000 lb in weight, 30 ft in length, and 1 ft in diameter. The staff found that the load calculation is accurate and the assumptions are reasonable for use as part of the MSA review.

In summary, the staff determined the licensee's methods were appropriate and the provided AE parameters are reasonable for use in the MSA.

3.5 Conclusion

The NRC staff has reviewed the information provided in the Davis-Besse MSA related to the original FLEX strategies, as assessed against the reevaluated hazards. The staff concludes that the licensee has demonstrated the capability to implement FLEX strategies, as modified, against the reevaluated hazards described in the ISR letter. The NRC staff made its determination based upon:

- All Phase 1 and 2 strategies, as currently designed, contain sufficient margin to allow local floodwaters to recede prior to any required FLEX "N" actions or equipment deployment. As a result, implementation timelines should not be impacted;

- All FLEX "N" equipment (except two debris removal trucks), which is stored in the EFWF and the auxiliary building, should be available and not impacted as a result of a LIP and/or PMSS;

- Alternate staging areas for Phase 3 equipment have been identified to allow the completion of Phase 3 actions;

- Revised trigger points, which allow for FLEX "N+1" equipment to be deployed prior to the deployment path being flooded, have been identified and are being developed; and

- The proposed modifications to the existing FLEX strategy have been identified and are being tracked in the Davis-Besse corrective action program.

Therefore, the NRC staff concludes that the licensee has demonstrated the capability to implement the original FLEX strategies, with modifications, under the conditions associated with the reevaluated LIP and PMSS floods, including associated effects and flood event duration, as described in NEI 12-06, Revision 2, and JLD-ISG-2012-01, Revision 1.

4.0 CONCLUSION

The NRC staff has reviewed the information presented by the licensee in the MSA for Davis-Besse. The NRC staff confirmed that the licensee's flood hazard MSA for Davis-Besse 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 use of the hazard characterized in the NRC staff's ISR letter, the methodology used in the Davis-Besse MSA evaluation, and the description of its current FLEX strategy in the Davis-Besse MSA and supporting documentation, the NRC staff concludes that the licensee has demonstrated that the mitigation strategies appear to be reasonably protected from reevaluated flood hazards conditions.

Table 3.3-1. Flood Event Durations for Flood-Causing Mechanisms Not Bounded by the CDB

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	1 hr	2 – 5 hrs	< 6 hrs
Storm Surge	1 hr	2.5 hrs	14 – 44 hrs

TABLE 3.4-1. ASSOCIATED EFFECTS PARAMETERS NOT DIRECTLY ASSOCIATED WITH TOTAL WATER HEIGHT FOR FLOOD-CAUSING MECHANISMS NOT BOUNDED BY THE CDB

ASSOCIATED EFFECTS PARAMETER	FLOODING MECHANISM			
	Local Intense Precipitation and Associated Drainage		Storm Surge	
	Powerblock (1)	*Intake Structure*	*Powerblock* (1)	*Intake Structure*
Hydrodynamic loading at plant grade	< 73 psf	< 58 psf	< 2.34 psf	2.34 psf
Debris loading at plant grade	Minimal	Minimal	Minimal	Minimal
Sediment loading at plant grade	Minimal	Minimal	Minimal	Minimal
Sediment deposition and erosion	Minimal	Minimal	Minimal	Minimal
Concurrent conditions, including adverse weather	Minimal	Minimal	Minimal	Minimal
Groundwater ingress	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Other pertinent factors (e.g., waterborne projectiles)	Not Applicable	Not Applicable	Minimal	Minimal

(1) Refers to multiple locations with the powerblock.

DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1 – FLOOD HAZARD MITIGATION STRATEGIES ASSESSMENT DATED APRIL 12, 2017

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