



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

March 4, 2019

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

**SUBJECT: NRC RESPONSE TO REQUEST FOR DEFERRAL OF ACTIONS RELATED TO BEYOND-DESIGN-BASIS FLOODING HAZARD REEVALUATIONS FOR DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1**

Dear Mr. Bezilla:

The purpose of this letter is to provide the U.S. Nuclear Regulatory Commission (NRC) staff's response to the letter received from FirstEnergy Nuclear Operating Company (FENOC, the licensee) on October 30, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18303A092), related to post-Fukushima flooding hazard reevaluations at Davis-Besse Nuclear Power Station, Unit 1 (Davis-Besse). The letter requested a deferral of NRC staff review of the flooding focused evaluation (FE) associated with the flooding hazard activities in anticipation of the planned permanent shutdown of Davis-Besse on May 31, 2020.

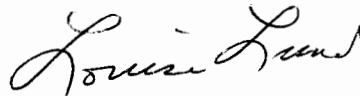
The NRC staff has determined that deferring the detailed staff review of the flooding FE is acceptable for Davis-Besse, based on the staff's assessment that:

- The licensee has demonstrated that additional defense-in-depth has been achieved for coping with an extended loss of alternating current power and loss of normal access to the ultimate heat sink due to external events as a result of the site's 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. ML12054A735). The NRC inspectors verified that the mitigation strategies have been appropriately implemented at Davis-Besse as documented in a May 23, 2017, inspection report (ADAMS Accession No. ML17143A342),
- The licensee has demonstrated, if implemented as described, to have reasonable protection of mitigating strategies against the unbounded mechanisms evaluated under the post-Fukushima flooding hazard reevaluations as documented in a staff assessment dated April 12, 2017 (ADAMS Accession No. ML17086A499),
- Reasonable protection of mitigating strategies against the unbounded mechanisms will continue to be maintained until permanent shutdown,
- The staff considered the remaining operational period, FE review period, and the time to implement any potential changes identified prior to permanently defueling the plant, such that a meaningful further safety improvement can be achieved.

Based on the evaluation found in the Enclosure to this letter, and after consultation with the Director of the NRC's Office of Nuclear Reactor Regulation, the NRC staff concludes that the NRC staff's review of the Davis-Besse flooding FE and the remaining activities associated with the March 12, 2012, request for information under Title 10 of the *Code of Federal Regulations*, Section 50.54(f) are considered deferred until May 31, 2020. If Davis-Besse does permanently cease operations on or before this date, and should FENOC determine that the remaining 50.54(f) letter activities are no longer necessary based on the shutdown conditions of the plant, the staff expects that FENOC would document such a request in a letter, with the appropriate basis supporting the request, prior to May 31, 2020. Alternatively, if Davis-Besse does not permanently cease operations by May 31, 2020, the staff also expects that FENOC would document such a decision in a timely letter prior to this date accompanied by a request for NRC to complete its review of the remaining 50.54(f) letter activities.

If you have any questions, please contact Juan Uribe, Project Manager, at (301) 415-3809 or via e-mail at [Juan.Uribe@nrc.gov](mailto:Juan.Uribe@nrc.gov).

Sincerely,



Louise Lund, Director  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

Docket No. 50-346

Enclosure:  
Evaluation of Davis-Besse's  
Flooding Deferral Request

cc w/encl: Distribution via Listserv

NRC RESPONSE TO REQUEST FOR DEFERRAL OF ACTIONS RELATED TO  
BEYOND-DESIGN-BASIS FLOODING HAZARD REEVALUATIONS  
FOR DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1

1. INTRODUCTION

By letter dated March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued a request for information under Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (hereafter referred to as the 50.54(f) letter), to all nuclear power reactor licensees and construction permit holders in response to lessons learned from the March 2011 accident at Japan's Fukushima Dai-ichi nuclear power plant (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340). Enclosure 2 of the 50.54(f) letter requested that licensees perform flooding hazard reevaluations using present-day methodologies and guidance, and then assess the impact of the reevaluated hazards on the plant.

By letters dated September 1, 2015 (ADAMS Accession No. ML15174A257), "Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events", and September 21, 2016 (ADAMS Accession No. ML16237A108), "Regulatory Decision-Making for Reevaluated Flooding and Seismic Hazards for Operating Nuclear Power Plants", the NRC described changes in the regulatory process to address the flooding reevaluated hazards using a graded approach commensurate with the safety significance of the reevaluated flooding hazard at each site (e.g., focused evaluations and revised integrated assessments), and its plan for completing and closing actions, which included guidance on further regulatory decision for sites submitting a revised integrated assessment. The NRC staff would then review the completed responses to these assessments in order to determine if there is a need for any additional regulatory actions, such as a plant-specific backfit.

Concurrent with the reevaluation of flooding hazards, licensees were required to develop and implement mitigating strategies under 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 the implementation of Order EA-12-049, licensees used the current design basis flood and seismic hazard or the most recent flood and seismic hazard information, which may not be based on present-day methodologies and guidance, in developing their mitigation strategies.

2. BACKGROUND

As part of the flooding hazard reevaluation process described in the 50.54(f) letter, Davis-Besse submitted a Flooding Walkdown Report by letter dated November 27, 2012 (ADAMS Accession No. ML13008A029), as supplemented by letter dated January 30, 2014 (ADAMS Accession No. ML14030A559). The flooding walkdowns were intended to identify and address degraded, nonconforming, or unanalyzed conditions through the corrective action program, and to verify the adequacy of the monitoring and maintenance procedures. By letter dated June 30, 2014 (ADAMS Accession No. ML14141A525), the NRC staff documented its review of the Flooding Walkdown Report and concluded that the licensee, through the implementation of the walkdown guidance activities, and in accordance with plant processes and procedures, verified the plant configuration with the current flooding licensing basis; addressed degraded, nonconforming, or

unanalyzed flooding conditions; and verified the adequacy of monitoring and maintenance programs for protective features.

Also, as part of the flooding hazard reevaluation process described in the 50.54(f) letter, Davis-Besse submitted its flood hazard reevaluation report (FHRR) by letter dated March 11, 2014 (ADAMS Accession No. ML14070A108). As part of its FHRR, FENOC provided interim actions at Davis-Besse which essentially relied on existing plant procedures and advanced warning time to address the unbounded hazards until a more detailed site-response analysis was performed. The NRC staff performed an inspection at Davis-Besse following NRC Temporary Instruction (TI) 2515/190, "Inspection of the Licensee's Proposed Interim Actions as a Result of the Near-Term Task Force Recommendation 2.1 Flooding Reevaluation," and documented its results by letter dated January 28, 2015 (ADAMS Accession No. ML15028A034), "Davis-Besse Nuclear Power Station NRC Integrated Inspection Report 050000346/2014005". No findings were identified in this report.

The NRC staff provided a summary of its review of the FHRR via an Interim Staff Response (ISR) letter issued September 3, 2015 (ADAMS Accession No. ML15239B210). For Davis-Besse, the flood-causing mechanisms considered to exceed the current design-basis were local intense precipitation (LIP) and probable maximum storm surge (PMSS). The NRC's letter also concluded that the licensee's reevaluated flood hazard information is suitable for assessment of mitigating strategies developed in response to Order EA-12-049 and for completion of the other flooding assessments being performed as part of the 50.54(f) letter.

By letter dated December 12, 2016 (ADAMS Accession No. ML16348A010), FENOC submitted the Mitigation Strategies Assessment (MSA) for Davis-Besse. By letter dated April 12, 2017 (ADAMS Accession No. ML17086A499), the NRC staff issued a staff assessment to the MSA and concluded that the licensee has demonstrated that the mitigation strategies under Order EA-12-049 appear to be reasonably protected from the unbounded reevaluated flood hazards conditions, as described in the ISR letter.

The focused evaluation (FE) for Davis-Besse was submitted by letter dated July 11, 2017 (ADAMS Accession No. ML17192A069). By letter dated April 2, 2018 (ADAMS Accession No. ML18094A661), the licensee notified the NRC that it had filed a voluntary petition for bankruptcy relief under Chapter 11 of Title 11 of the United States Code in the U.S Bankruptcy Court, Northern District of Ohio. Consistent with 10 CFR 50.82 (a)(1), FENOC notified the NRC by letter dated April 25, 2018 (ADAMS Accession No. ML18115A007), that it planned to permanently cease operations at Davis-Besse by May 31, 2020.

During the course of the NRC staff's review, FENOC submitted the October 30, 2018 (ADAMS Accession No. ML18303A092), letter, requesting a deferral of the staff's review of the flooding FE documented in the licensee's July 11, 2017, letter, in anticipation of the planned permanent shutdown of Davis-Besse in 2020.

### 3. EVALUATION

In its October 30, 2018, letter, the licensee requested deferral of the remaining 50.54(f) letter activities related to the reevaluation of flooding hazards and stated that based on the planned shutdown on May 31, 2020, there is insufficient time for the FE review effort to result in any appreciable safety benefit at the site, given that:

- The results of the unbounded reevaluated flood mechanisms (LIP and PMSS) do not impact key structures, systems, or components (SSCs) or challenge key safety functions (KSF),

- The time required for NRC's FE review and determination if additional information or actions are needed from FENOC,
- The time for the plant to evaluate, provide, and implement any actions following its review, and
- The availability of mitigation strategies against the reevaluated LIP and PMSS, based on changes implemented at the site as a result of the MSA.

### Deferral of Flooding Activities

As described in the ISR letter dated September 3, 2015 (ADAMS Accession No. ML15239B210), the flood-causing mechanisms considered to exceed the current design basis at Davis-Besse were LIP and PMSS. These mechanisms were evaluated by FENOC in the FE and partially reviewed by the NRC staff. The purpose of the FE is to demonstrate the plant's ability to cope with the reevaluated hazards and to identify if further safety enhancements (beyond the sites current protection and mitigation capabilities) are needed. The licensee performed the FE in accordance with Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines," (ADAMS Accession No. ML16165A178), which has been endorsed by the NRC.

Following the guidance in NEI 16-05, FENOC evaluated both mechanisms by first refining the unbounded flood hazards by revisiting the original assumptions, methods and inputs used in the development of the hazards in order to yield a more realistic, yet still bounding flood scenario. Subsequently, FENOC demonstrated effective flood protection against both flood hazard mechanisms. In the case of the PMSS, due to the existing site topography; and in the case of LIP, due to no impact of any SSCs that provide a KSFs. The three KSFs that are the focus of the staff's review are containment integrity, core-cooling, and spent fuel pool cooling.

For the unrefined LIP hazard (described in the ISR letter), the maximum reevaluated-flood stillwater elevation at the turbine building, intake structure, and auxiliary buildings is 585.5 feet (ft.), 585.5 ft., and 585.4 ft., respectively. The NRC staff also confirmed that waves and runup at these locations are minimal due to physical and spatial considerations, and therefore are considered negligible.

The staff notes that NEI 16-05 also describes guidance in which licensees may assess the impacts of LIP and demonstrate a feasible flood response in lieu of demonstrating effective flood protection. The process is intended to utilize NEI 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," where a process for determining the feasibility of carrying out a response strategy has already been implemented for FLEX strategies. By letter dated April 12, 2017, the NRC staff concluded in the MSA staff assessment that FENOC had demonstrated that the mitigation strategies available at the site (using the unrefined, higher hazard reviewed by the NRC staff as described in the ISR letter) appear to be reasonably protected from the unbounded reevaluated flood hazards conditions. Furthermore, FENOC stated in the deferral letter that NORM-LP-7203 "Davis-Besse FLEX Final Integrated Plan; Rev 0," and applicable emergency plan off-normal occurrence procedures (RA-EP-02810, "Tornado or High Winds," and RA-EP-02830, "Flooding") have been updated to incorporate the established trigger points. Based on the implementation of these changes, receiving a flood alert or high wind flood alert at the site will require immediate action in order to ensure that the FLEX "N+1" equipment is relocated within 2 hours of receipt of the notification. This results in adequate time for equipment to be staged prior to the potential flooding of the deployment path.

By letter dated May 23, 2017 (ADAMS Accession No. ML17143A342), the NRC staff issued inspection report 05000346/2017008 documenting the completion of Davis-Besse's FLEX strategies inspection performed on May 17, 2017, consistent with Temporary Instruction (TI)

2515/TI-191 "Inspection of the Implementation of Mitigation Strategies and Spent Fuel Pool Instrumentation Orders and Emergency Preparedness Communication/Staffing/Multi-Unit Dose Assessment Plans". The purpose of TI-191 was to allow inspectors to verify that plans for complying with NRC Orders EA-12-049 (mitigation strategies for beyond-design-basis external events) and EA-12-051 (spent fuel pool instrumentation) were in place and being implemented by the licensee. The purpose of this inspection was not to verify implementation of changes to address the reevaluated hazards; however, the inspectors did review several procedures that are also relevant to the MSA review such as NORM-LP-7203. No findings were identified with NORM-LP-7203.

During the review of deferral letter request, the NRC staff also requested that NORM-LP-7203, RA-EP-02810, and RA-EP-02830 be placed in an electronic reading room in order to allow the staff to confirm the implementation of the established trigger points. This was requested consistent with the audit plan issued by letter dated July 18, 2017 (ADAMS Accession No. ML17192A452). The NRC staff notes that FLEX equipment 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.

The NRC staff confirmed that trigger points have been established in these procedures such that upon receipt of a flood alert or high wind flood alert, the site is expected to take immediate action in order to ensure that the FLEX "N+1" equipment is relocated within 2 hours of receipt of the notification, thus providing adequate time for equipment to be staged prior to flooding of the deployment path. No FLEX "N" equipment was impacted because the emergency feedwater facility and the auxiliary building, which house this equipment, are not impacted by LIP.

For the unrefined PMSS hazard (described in the ISR letter), the maximum reevaluated-flood stillwater elevation is 585.8 ft. With the addition of waves and runoff, 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 also 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. Similar to a LIP 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.

As part of its MSA review, the NRC staff requested additional information about 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 (included as part of FENOC document NORM-LP-7221), 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 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. With regards to the establishment of trigger points, the licensee stated in the deferral request letter that site procedures NORM-LP-7203, RA-EP-02810, and RA-EP-02830 were updated to incorporate the established trigger points. As a result of these revisions, receiving a flood alert or high wind flood alert require the site to take

immediate action in order to ensure that the FLEX "N+1" equipment is relocated within 2 hours of receipt of the notification, thus providing adequate time for equipment to be staged prior to flooding of the deployment path.

The NRC staff was able to confirm that trigger points have been established in these procedures such that upon receipt of a flood alert or high wind flood alert, FLEX "N+1" equipment is relocated within 2 hours, thus providing adequate time for equipment to be staged prior to flooding of the deployment path. No FLEX "N" equipment was impacted because the emergency feedwater facility and the auxiliary building, which house this equipment, are not impacted by PMSS.

#### 4. CONCLUSION

The NRC staff has completed its review of the October 30, 2018, deferral request letter for Davis-Besse. The staff did not complete a review of the refined hazards presented by FENOC in the FE for Davis-Besse, and thus relies on the flood hazards described in the ISR letter and evaluated in the MSA to reach its determination. The staff has evaluated the licensee's request and considered the following factors in its evaluation:

- A flooding walkdown that verified the plant's configuration with the current flooding licensing basis; addressed degraded, nonconforming, or unanalyzed flooding conditions; and verified the adequacy of monitoring and maintenance programs for protective features has been completed. The licensee's walkdowns, as verified by staff inspection, identified no immediate safety concerns.
- Additional defense-in-depth has been achieved for coping with an extended loss of alternating current power and loss of normal access to the ultimate heat sink due to external events, including those caused by flooding events, as a result of Davis-Besse's compliance with Order EA-12-049. The NRC inspectors verified that the mitigation strategies have been appropriately implemented at Davis-Besse.
- FENOC has addressed the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events, and has implemented the necessary changes at the site that would reasonably ensure that the defense-in-depth capabilities are available, if needed. The NRC staff expects that FENOC will maintain the commitment to have mitigating strategies against the beyond-design-basis external events until May 31, 2020, as described in the deferral letter.

In addition to the above, the NRC staff also considered the infrequent nature of the reevaluated hazard events, and the limited period of operation remaining for Davis-Besse. As a result, the NRC staff concludes that the licensee has provided sufficient information to ensure that public health and safety are maintained throughout the deferral period for Davis-Besse without the need for the completion of the FE review during that time. Furthermore, the NRC staff also concludes that FENOC's proposal to defer the remaining activities associated with the March 12, 2012, 50.54(f) letter is acceptable and are considered deferred until May 31, 2020.

If Davis-Besse does permanently cease operations on or before this date, and should FENOC determine that the remaining 50.54(f) letter activities are no longer necessary based on the shutdown conditions of the plant, the staff expects that FENOC would document such a request in a letter prior to May 31, 2020. Alternatively, if Davis-Besse does not permanently cease operations by May 31, 2020, the staff also expects that FENOC would document such a decision in a timely letter prior to this date accompanied by a request for NRC to complete its review of the remaining 50.54(f) letter activities.

NRC RESPONSE TO REQUEST FOR DEFERRAL OF ACTIONS RELATED TO BEYOND-DESIGN-BASIS FLOODING HAZARD REEVALUATIONS DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1 DATED: March 4, 2019

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