



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

December 21, 2016

Mr. David A. Heacock  
President and Chief Nuclear Officer  
Dominion Nuclear  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

**SUBJECT:     MILLSTONE POWER STATION, UNITS 2 AND 3 – INTERIM STAFF  
                 RESPONSE TO REEVALUATED FLOOD HAZARDS SUBMITTED IN  
                 RESPONSE TO 10 CFR 50.54(f) INFORMATION REQUEST – FLOOD-  
                 CAUSING MECHANISM REEVALUATION (CAC NOS. MF6109 AND MF6110)**

Dear Mr. Heacock:

The purpose of this letter is to provide a summary of the U.S. Nuclear Regulatory Commission (NRC) staff's assessment of the reevaluated flood-causing mechanisms described in the March 12, 2015, flood hazard reevaluation report (FHRR) submitted by Dominion Nuclear Connecticut, Inc. (the licensee) for Millstone Power Station, Units 2 and 3 (MPS2 and MPS3) (Agencywide Document Access and Management System (ADAMS) Accession No. ML15078A203), as well as supplemental information resulting from audits.

This letter and the enclosed tables supersede the NRC's partial interim staff response letter dated October 13, 2016 (ADAMS Accession No. ML16267A131). This letter includes a correction to the tables provided in that letter. Specifically, in the October 13, 2016, letter, a design-basis flood evaluation for tsunami hazards was given incorrectly for each unit. In fact, tsunami hazards were not considered in the design basis for MPS2 and MPS3. The enclosed tables supersede the tables in the October 13, 2016, letter with the change being the replacement of the tsunami hazard design-basis flood elevation level with a note that tsunami hazards are not included in the design basis. In addition, the design basis for storm surge in both Tables 1 was corrected. This letter also includes a discussion of the path forward in light of the licensee's decision to use a probabilistic storm surge analysis as part of its flood hazard reevaluation.

By letter dated March 12, 2012, the NRC issued a request for information pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.54(f) (hereafter referred to as the 50.54(f) letter) (ADAMS Accession No. ML12053A340). The request was issued as part of implementing lessons learned from the accident at the Fukushima Dai-ichi nuclear power plant. Enclosure 2 to the 50.54(f) letter requested licensees to reevaluate flood-causing mechanisms using present-day methodologies and guidance. Concurrent with the reevaluation of flooding hazards, licensees were required to develop and implement mitigating strategies in accordance

with NRC Order EA-12-049, "Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML12054A735). On March 30, 2015, the Commission provided staff requirements memorandum (SRM) (ADAMS Accession No. ML15089A236) to COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards," dated November 21, 2014 (ADAMS Accession No. ML14309A256), affirming that licensees need to address the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events.

Revision 2 of Nuclear Energy Institute (NEI) guidance document NEI 12-06, dated December 2015, includes a methodology for performing a mitigating strategies assessment (MSA) with respect to the reevaluated flood hazards. On February 29, 2016, the NRC staff published 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. ML15357A142), in the *Federal Register* (81 FR 10283). This ISG endorses Revision 2 of NEI 12-06 (ADAMS Accession No. ML16005A625). Based on the guidance provided in Revision 2 of NEI 12-06, flood event duration parameters and applicable flood associated effects should be considered as part of the MPS2 and MPS3 MSA. The NRC staff will evaluate the flood event duration parameters (including warning time and period of inundation) and flood-related associated effects developed by the licensee during the NRC staff's review of the MSA.

In addition to the MSA, in order to complete its response to the information requested by Enclosure 2 to the 50.54(f) letter, the licensee is expected to submit an integrated assessment or a focused evaluation, as appropriate, to address the reevaluated flood hazards that exceed the current design basis, as described in the NRC letter, "Coordination of Request for Information Regarding Flooding Hazard Reevaluation and Mitigating Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15174A257). This letter describes the changes in the NRC's approach to the flood hazard reevaluations that were approved by the Commission in its SRM to COMSECY-15-0019, "Closure Plan for the Reevaluation of Flooding Hazards for Operating Nuclear Power Plants" (ADAMS Accession No. ML15209A682).

The NRC staff has reviewed the information submitted by the licensee in its FHRR and has summarized the results of the review in the tables provided as an enclosure to this letter. Table 1 provides the current design-basis flood hazard mechanisms. Table 2 provides the reevaluated flood hazard mechanisms; however, the reevaluated flood hazard mechanisms bounded by the current design basis (Table 1) are not included. Because of the difference in the licensing basis and the elevations for MPS2 and MPS3, there is a Table 1 and Table 2 for each site.

The attached tables do not include the staff's assessment of flooding due to storm surge. In its FHRR, the licensee submitted both deterministic and probabilistic storm surge analyses. The NRC staff had been focusing its review on the deterministic methodology. During a November 3, 2016, teleconference held as part of the audit,<sup>1</sup> the licensee informed the NRC staff that it intends to use the probabilistic storm surge analysis in its flood hazard reevaluation. The NRC's review of this complex methodology may extend beyond the expected submittal

---

<sup>1</sup> The audit plan, dated June 15, 2015, is available at ADAMS Accession No. ML15153A077.

dates for the MSA and the additional flooding evaluations related to the 50.54(f) letter. Therefore, the licensee proposed using its results for the probabilistic storm surge analysis as an input for the additional assessments while the NRC staff's review is ongoing. The NRC staff agreed with this approach. The MSA is expected to be submitted in June 2017 and a focused evaluation is expected to be submitted in December 2017. The staff's evaluation of the probabilistic storm surge analysis is continuing and future correspondence documenting the results of the staff's review will be forthcoming. The licensee acknowledged that these submittals may need to be revised based on the results of the NRC's review of this mechanism.

For other flood-causing mechanisms, the NRC staff has concluded that the licensee's reevaluated flood hazards information, as summarized in the enclosure, is suitable for the assessment of mitigating strategies developed in response to Order EA-12-049 (i.e., defines the mitigating strategies flood hazard information described in Nuclear Energy Institute (NEI) guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide") for MPS2 and MPS3. Further, the NRC staff has concluded that the licensee's reevaluated flood hazard information is a suitable input for other flooding assessments associated with the 50.54(f) letter. The NRC staff plans to issue a staff assessment documenting the basis for these conclusions at a later time.

If you have any questions, please contact me at (301) 415-1056 or e-mail at [Lauren.Gibson@nrc.gov](mailto:Lauren.Gibson@nrc.gov).

Sincerely,



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

Docket Nos. 50-336 and 50-423

Enclosure:  
Summary of Results of Flooding  
Hazard Re-Evaluation Report

cc w/encl: Distribution via Listserv

**Table 1. Current Design Basis Flood Hazards for Use in the MSA**

<b>Mechanism</b>	<b>Stillwater Elevation</b>	<b>Waves/ Runup</b>	<b>Design Basis Hazard Elevation</b>	<b>Reference</b>
<b>Local Intense Precipitation</b>	14.5 ft NGVD29	Minimal	14.5 ft NGVD29	FHRR Table 1.2-1
<b>Streams and Rivers</b>	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-1
<b>Failure of Dams and Onsite Water Control/Storage Structures</b>	Not included in DB	Not included in DB	Not included in DB	FHRR Sections 2.3.3 & 3.3
<b>Storm Surge</b>				
Storm Surge (standing wave) within the Intake Structure for Unit 2	26.5 ft NGVD29	Not applicable	26.5 ft NGVD29	FHRR Sections 1.5 and 3.4
Storm Surge at the Powerblock	18.1 ft NGVD29	7.0 ft	25.1 ft NGVD29	FHRR Section 3.9 and FHRR Table 3.0-1 FHRR Table 1.2-1
<b>Seiche</b>	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-1
<b>Tsunami</b>	Not included in DB	Not included in DB	Not included in DB	FHRR Table 1.2-1
<b>Ice-Induced Flooding</b>	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-1

**Table 1. Current Design Basis Flood Hazards for Use in the MSA**

<b>Mechanism</b>	<b>Stillwater Elevation</b>	<b>Waves/ Runup</b>	<b>Design Basis Hazard Elevation</b>	<b>Reference</b>
<b>Channel Migrations/Diversions</b>	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-1

Note 1: Reported values are rounded to the nearest one-tenth of a foot.

**Table 2. Reevaluated Flood Hazards for Flood-Causing Mechanisms for Use in the MSA**

<b>Mechanism</b>	<b>Stillwater Elevation</b>	<b>Waves/ Runup</b>	<b>Reevaluated Hazard Elevation</b>	<b>Reference</b>
<b>Local Intense Precipitation</b>	17.5 ft NGVD29	Minimal	17.5 ft NGVD29	FHRR Section 3.1
<b>Streams and Rivers</b>	11.2 ft NGVD29	Not applicable	11.2 ft NGVD29	FHRR Section 2.2
<b>Storm Surge</b>	Under Review	Under Review	Under Review	
<b>Tsunami</b>	14.7 ft NGVD29	Not applicable	14.7 ft NGVD29	FHRR Section 2.6

Note 1: The licensee is expected to develop flood event duration parameters and applicable flood associated effects to conduct the MSA. The staff will evaluate the flood event duration parameters (including warning time and period of inundation) and flood associated effects during its review of the MSA.

Note 2: Reevaluated hazard mechanisms bounded by the current design basis (see Table 1) are not included in this table.

Note 3: Reported values are rounded to the nearest one-tenth of a foot.

**Table 1. Current Design Basis Flood Hazards for Use in the MSA**

<b>Mechanism</b>	<b>Stillwater Elevation</b>	<b>Waves/ Runup</b>	<b>Design Basis Hazard Elevation</b>	<b>Reference</b>
<b>Local Intense Precipitation</b>				
RWST/SIL Valve Enclosure	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 1.2-3 and Table 3.0-3
Demineralized Water Storage Tank Block House	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 1.2-3
Fuel Building	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 1.2-3
Auxiliary Building Door A-24-6	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 3.0-3
Engineered Safety Features Building	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 1.2-3
Hydrogen Recombiner Building	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 1.2-3
Main Steam Valve Building	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 1.2-3
Emergency Generator Enclosure	24.3 ft NGVD29	Minimal	24.3 ft NGVD29	FHRR Table 1.2-3
Auxiliary Building Door A-24-1	24.9 ft NGVD29	Minimal	24.9 ft NGVD29	FHRR Table 3.0-3
Control Building	24.3 ft NGVD29	Minimal	24.3 ft NGVD29	FHRR Table 1.2-3
<b>Streams and Rivers</b>				
	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-2

**Table 1. Current Design Basis Flood Hazards for Use in the MSA**

<b>Mechanism</b>	<b>Stillwater Elevation</b>	<b>Waves/ Runup</b>	<b>Design Basis Hazard Elevation</b>	<b>Reference</b>
<b>Failure of Dams and Onsite Water Control/Storage Structures</b>	Not included in DB	Not included in DB	Not included in DB	FHRR Sections 2.3.3 & 3.3
<b>Storm Surge</b>				
Storm Surge at Seaward Wall of Intake Structure for Unit 3	19.7 ft NGVD29	21.5 ft	41.2 ft NGVD29	FHRR Section 3.9
Storm Surge at Powerblock	19.7 ft NGVD29	4.1 ft	23.8 ft NGVD29	FHRR Section 1.5 FHRR Table 1.2-2
<b>Seiche</b>	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-2
<b>Tsunami</b>	Not included in DB	Not included in DB	Not included in DB	FHRR Table 1.2-2
<b>Ice-Induced Flooding</b>	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-2
<b>Channel Migrations/Diversions</b>	No Impact on the Site Identified	No Impact on the Site Identified	No Impact on the Site Identified	FHRR Table 1.2-2

Note 1: Reported values are rounded to the nearest one-tenth of a foot.

**Table 2. Reevaluated Flood Hazards for Flood-Causing Mechanisms for Use in the MSA**

<b>Mechanism</b>	<b>Stillwater Elevation</b>	<b>Waves/ Runup</b>	<b>Reevaluated Hazard Elevation</b>	<b>Reference</b>
<b>Streams and Rivers</b>	11.2 ft NGVD29	Not applicable	11.2 ft NGVD29	FHRR Section 2.2
<b>Storm Surge</b>	Under Review	Under Review	Under Review	
<b>Tsunami</b>	14.7 ft NGVD29	Not applicable	14.7 ft NGVD29	FHRR Section 2.6

Note 1: The licensee is expected to develop flood event duration parameters and applicable flood associated effects to conduct the MSA. The staff will evaluate the flood event duration parameters (including warning time and period of inundation) and flood associated effects during its review of the MSA.

Note 2: Reevaluated hazard mechanisms bounded by the current design basis (see Table 1) are not included in this table.

Note 3: Reported values are rounded to the nearest one-tenth of a foot.

Therefore, the licensee proposed using its results for the probabilistic storm surge analysis as an input for the additional assessments while the NRC staff's review is ongoing. The NRC staff agreed with this approach. The MSA is expected to be submitted in June 2017 and a focused evaluation is expected to be submitted in December 2017. The staff's evaluation of the probabilistic storm surge analysis is continuing and future correspondence documenting the results of the staff's review will be forthcoming. The licensee acknowledged that these submittals may need to be revised based on the results of the NRC's review of this mechanism.

For other flood-causing mechanisms, the NRC staff has concluded that the licensee's reevaluated flood hazards information, as summarized in the enclosure, is suitable for the assessment of mitigating strategies developed in response to Order EA-12-049 (i.e., defines the mitigating strategies flood hazard information described in Nuclear Energy Institute (NEI) guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide") for MPS2 and MPS3. Further, the NRC staff has concluded that the licensee's reevaluated flood hazard information is a suitable input for other flooding assessments associated with the 50.54(f) letter. The NRC staff plans to issue a staff assessment documenting the basis for these conclusions at a later time.

If you have any questions, please contact me at (301) 415-1056 or e-mail at [Lauren.Gibson@nrc.gov](mailto:Lauren.Gibson@nrc.gov).

Sincerely,

/RA/

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

Docket Nos. 50-336 and 50-423

Enclosure:

Summary of Results of Flooding

Hazard Re-Evaluation Report

cc w/encl: Distribution via Listserv

**DISTRIBUTION:**

PUBLIC	JLD R/F	RidsNRRJLD Resource
LGibson, NRR	LQuinn-Willingham, NRO	RidsNroDsea Resource
RidsNrrDorlLp1-2 Resource	RidsNrrDorl Resource	RidsNrrPMMillstone Resource
RidsRgn1MailCenter Resource	RidsNrrLASLent	RidsOgcMailCenter Resource
RidsOpaMail Resource	RidsAcraAcnw_MailCtr Resource	CCook, NRO
ARivera-Varona, NRO	KErwin, NRO	ACampbell, NRO
MWillingham, NRO	LHibler, NRO	BHarvey, NRO
MShams, NRR	RRivera-Lugo, NRO	GBowman, NRR

**ADAMS Accession Nos.: PKG ML16308A234 LTR: ML16308A226 ENCL: ML16266A546 \*via email**

<b>OFFICE</b>	NRR/JLD/JHMB/PM	NRR/JLD/L	NRO/DSEA/EHM1/B	NRR/JLD/JHMB/BC(A	NRR/JLD/JHMB/P
<b>E</b>	*	A	C *	)	M
<b>NAME</b>	LGibson	SLent	CCook	GBowman	LGibson
<b>DATE</b>	12/ 13 /16	12/ 13 /16	12/19/16	12/ 14 /16	12/ 21 /16

OFFICIAL AGENCY RECORD