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10 CFR 50.54(f)

JAFP-17-0077
July 27, 2017

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Subject: Mitigating Strategies Assessment (MSA) for the Reevaluated Flooding Hazards Pursuant to 10 CFR 50.54(f) Request for Information Regarding Recommendation 2.1: Flooding of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident

James A FitzPatrick Nuclear Power Plant
Docket No. 50-333
Renewed Facility Operating License No. DPR-059

References:

1. NRC letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, ML12053A340, dated March 12, 2012
2. Entergy letter, Flood Hazard Reevaluation Report - Response NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, JAFP-15-0036, dated March 12, 2015
3. NEI document, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 2, NEI 12-06, dated December 2015
4. NRC interim staff guidance, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events, Revision 1, JLD-ISG-2012-01, dated January 22, 2016

Dear Sir or Madam:

On March 12, 2012, the NRC requested information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding [Reference 1]. One of the Required Responses in Reference 1 directed licensees to submit a Flood Hazard Reevaluation Report (FHRR). For James A. FitzPatrick Nuclear Power Plant (JAF), the FHRR was submitted on March 12, 2015 [Reference 2]. This letter addresses the flooding mitigating strategies assessments (MSA) under the reevaluated flooding hazards developed in response to Reference 1.

Guidance for performing MSAs is contained in Appendix G of Reference 3, endorsed by the NRC (with conditions) in Reference 4.

A complete comparison of the FLEX design basis (DB) and reevaluated flood hazards, provided in the Attachment, shows that the FLEX DB bounds the Mitigating Strategies Flood Hazard Information (MSFHI) for all applicable flood-causing mechanisms, including associated effects and flood event duration parameters. Therefore, JAF considers the requirement to address the reevaluated flooding hazards within its beyond design basis mitigating strategies as being satisfied by the designed mitigating strategy.

This letter contains no new regulatory commitments. Should you have any questions regarding this submittal, please contact Mr. William C. Drews, Regulatory Assurance Manager at (315) 349-6562.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 27th day of July, 2017.

Sincerely,

Joseph E. Pacher
Site Vice President

JEP/WCD/mh

Attachment: FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

cc: Director, Office of Nuclear Reactor Regulation
NRC Region I Administrator
NRC Resident Inspector
NRC Project Manager
NYSPSC
President NYSERDA

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Attachment

FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

(7 Pages)

FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

For the purpose of the mitigating strategies assessments (MSA), the NRC has termed the reevaluated flood hazard, summarized in References 5 and 7, as the "Mitigating Strategies Flood Hazard Information" (MSFHI). Reference 3, Appendix G, describes the MSA for flooding as containing the following elements:

- Section G.2 – Characterization of the MSFHI
- Section G.3 – Comparison of the MSFHI and FLEX Design Basis (DB) Flood
- Section G.4.1 – Assessment of Current FLEX Strategies (if necessary)
- Section G.4.2 – Assessment for Modifying FLEX Strategies (if necessary)
- Section G.4.3 – Assessment of Alternative Mitigating Strategies (if necessary)
- Section G.4.4 – Assessment of Targeted Hazard Mitigating Strategies (if necessary)

The following provides the flooding MSA results for JAF:

Reference 3, Section G.2 – Characterization of the MSFHI

Characterization of the Mitigating Strategies Flood Hazard Information (MSFHI) is summarized in Table 1 of Reference 5 and Tables 3.1-1 through 4.3-1 of Reference 7, the NRC's Interim Response and Staff Assessment Report for the flood hazard reevaluation submittal (Reference 2), respectively. A more detailed description of the MSFHI, along with the basis for inputs, assumptions, methodologies, and models, is provided in the following references:

- Local Intense Precipitation (LIP): See Section 3.1 of Reference 2, Enclosure.
- Flooding in Streams and Rivers: See Section 3.2 of Reference 2, Enclosure.
- Dam Breaches and Failures: See Section 3.3 of Reference 2, Enclosure.
- Storm Surge: See Section 3.4 of Reference 2, Enclosure.
- Seiche: See Section 3.5 of Reference 2, Enclosure.
- Tsunami: See Section 3.6 of Reference 2, Enclosure.
- Ice-Induced Flooding: See Section 3.7 of Reference 2, Enclosure.
- Channel Migration or Diversion: See Section 3.8 of Reference 2, Enclosure.
- Combined Effects (including wind-waves and runup effects): See Section 3.9 of Reference 2, Enclosure.

As discussed in Reference 2, only the LIP and probable maximum flood (PMF) on the local unnamed stream cause inundation of the JAF site in the vicinity of SSCs important to safety. Parameters for these flood-causing mechanisms, including associated effects and flood event duration, are described in detail in Reference 2 and are summarized in the tables below. Additionally, since the Combined Effects flood (PMSS + PMP + Waves) is not bounded by the current design basis, parameters for this mechanism are also included in the tables.

In Reference 5, the NRC concluded that the "reevaluated flood hazards information (i.e. MSFHI), as summarized in the Attachment [Summary Table of the Reevaluated Flood Hazard Levels], is suitable for the assessment of mitigating strategies developed in response to Order EA-12-049" for JAF. Reference 7 further affirmed that the "the reevaluated flood-causing mechanism information is appropriate input to additional assessments of plant response, as described in the 50.54(f) letter, COMSECY-15-0019, and associated guidance". The flood event duration parameters and applicable flood-associated effects, developed in Reference 2 and the associated supplemental documentation, are captured in Tables 4.2-1 and 4.3-1 of Reference 7. These parameters are used to evaluate the FLEX DB.

Reference 3, Section G.3 – Basis for Mitigating Strategies Assessment (FLEX DB Comparison)

At JAF, the FLEX design basis (FLEX DB) is primarily based on the plant's current design basis flood but incorporated the reevaluated flood hazard (i.e. MSFHI), including the LIP and the PMF, which inundate areas around the site. Note, the FLEX Compliance Letter and Final Integrated Plan have not yet been submitted. However, the strategy as it relates to flooding is not expected to change.

FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

Table 1 – Local Intense Precipitation

Flood Scenario Parameter		Plant Current Design Basis Flood Hazard	FLEX Design Basis Flood Hazard	MSFHI LIP	Bounded (B) / Not Bounded (NB) by FLEX DB
Flood Level and Associated Effects	1. Max Stillwater Elevation (ft. USLS35)	See Note 1	272.8 See Note 1	272.8 See Note 1	B
	2. Max Wave Run-up Elevation (ft. USLS35)	Not Identified in CDB	Not Identified.	See Note 2	B
	3. Max Hydrodynamic/Debris Loading (psf)	Not identified in the CDB	See Note 3	See Note 3	B
	4. Effects of Sediment Deposition/Erosion	Not identified in the CDB	See Note 4	See Note 4	B
	5. Other Associated effects (identify each effect)	N/A	N/A	N/A	B
	6. Concurrent Site Conditions	Not identified in the CDB	See Note 5	See Note 5	B
	7. Effects on Groundwater	Not identified in the CDB	See Note 6	See Note 6	B
Flood Event Duration	8. Warning Time (hours)	Not identified in the CDB.	Not identified.	See Note 7	B
	9. Period of Site Preparation (hours)	Not identified in the CDB	Not identified.	See Note 8.	B
	10. Period of Inundation (hours)	Not identified in the CDB	<9.0 for doors <20.0 for plant See Note 9	<9.0 for doors <20.0 for plant See Note 9	B
	11. Period of Recession (hours)	Not identified in the CDB	See Note 10	See Note 10	B
Other	12. Plant Mode of Operations	Normal Operations	Normal Operations	Normal Operations	B
	13. Other Factors	N/A	N/A	N/A	N/A

N/A = Not Applicable

Additional notes and explanations regarding the bounded/non-bounded determination:

1. The Plant current design basis (CDB) does not evaluate surface flooding, but does consider 9.6 inches for rooftop inundation. The Mitigating Strategies Flood Hazard Information (MSFHI) lists the highest Local Intense Precipitation (LIP) flooding elevation of 272.8 ft. The FLEX Strategy evaluates the flood levels and their impacts at locations of specific interest to the FLEX strategy, which can be lower than the highest flood level of 272.8 ft and concludes that there are no adverse impacts to implementing the FLEX strategy due to a LIP induced flooding event.
2. Wind/wave interaction was not considered to be a credible mechanism coincident with the LIP event due to site constraints, including shallow depths, obstructed fetches, and frequent barriers to wave formation and action.
3. Hydrodynamic loading was not formally evaluated as velocities were found to be so low as to create negligible loading.
4. The potential for erosion was evaluated and is not anticipated to affect structures important to safety, as flow velocities near critical plant structures are below US Army Core of Engineers (USACE)

FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

standards for paved surfaces. The FHRR also did not identify any sedimentation deposition. Therefore, this is considered bounded.

5. No antecedent storm was considered with the LIP event because the LIP event is a distinct flooding mechanism that consists of a short-duration, locally heavy rainfall centered upon the plant site itself.
6. Groundwater ingress due to LIP is considered an insignificant hazard for the JAF site.
7. Warning time for the beyond design basis flood events postulated in the FHRR is not credited or deemed necessary for the JAF FLEX Strategy because the FLEX Strategy can be implemented following LIP induced flooding event.
8. Significant plant preparation for the beyond design basis flood events postulated in the FHRR is not credited or deemed necessary at JAF for the FLEX Strategy.
9. The LIP flood mechanism can cause certain areas along the deployment path from the “N+1” storage building to become inundated. The equipment stored in the “N+1” storage building is not the primary equipment for a Flood induced beyond design basis external event (BDBEE) and only serves as a backup capability to the “N” set of equipment. The primary storage location for a full “N” set of FLEX equipment is protected and deployable after an external flooding event. Therefore, the FLEX strategies are not affected by the LIP event and can be implemented successfully.
10. The time to recession at various doors to buildings is provided in Appendix A of the FHRR and was considered in the FLEX DB. No adverse impacts to the FLEX Strategies are noted.

FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

Table 2 – Unnamed Stream PMF

Flood Scenario Parameter		Plant Current Design Basis Flood Hazard	FLEX Design Basis Flood Hazard	MSFHI Unnamed Stream PMF	Bounded (B) / Not Bounded (NB) by FLEX DB
Flood Level and Associated Effects	1. Max Stillwater Elevation (ft. USLS35)	Not Identified in CDB	272.8 See Note 1	272.8	B
	2. Max Wave Run-up Elevation (ft. USLS35)	Not Identified in CDB	Not Identified.	See Note 2	B
	3. Max Hydrodynamic/Debris Loading (psf)	Not identified in the CDB	See Note 3	See Note 3	B
	4. Effects of Sediment Deposition/Erosion	Not identified in the CDB	See Note 4	See Note 4	B
	5. Other Associated effects (identify each effect)	N/A	N/A	N/A	B
	6. Concurrent Site Conditions	Not identified in the CDB	See Note 5	See Note 5	B
	7. Effects on Groundwater	Not identified in the CDB	See Note 6	See Note 6	B
Flood Event Duration	8. Warning Time (hours)	Not identified in the CDB.	Not identified.	See Note 7	B
	9. Period of Site Preparation (hours)	Not identified in the CDB	Not identified.	See Note 8	B
	10. Period of Inundation (hours)	Not identified in the CDB	≤5.5 for doors, 49.5 for this event. See Note 9	≤5.5 for doors, 49.5 for this event. See Note 9	B
	11. Period of Recession (hours)	Not identified in the CDB	See Note 10	See Note 10	B
Other	12. Plant Mode of Operations	Normal Operations	Normal Operations	Normal Operations	B
	13. Other Factors	N/A	N/A	N/A	N/A

N/A = Not Applicable

Additional notes and explanations regarding the bounded/non-bounded determination:

1. The MSFHI lists the highest flooding elevation of 272.8 ft. The FLEX Strategy evaluates the flood levels and their impacts at locations of specific interest to the FLEX strategy, which can be lower than the highest flood level of 272.8 ft and concludes that there are no adverse impacts to implementing the FLEX strategy due to flooding event.
2. Wind/wave interaction was not considered to be a credible mechanism coincident with the probable maximum flood (PMF) event due to site constraints, including shallow depths, obstructed fetches, and frequent barriers to wave formation and action.
3. Hydrodynamic loading was not formally evaluated as velocities were found to be so low as to create negligible loading.

FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

4. The potential for erosion was evaluated and is not anticipated to affect structures important to safety, as flow velocities near critical plant structures are below USACE standards for paved surfaces. The FHRR also did not identify any sedimentation deposition. Therefore, this is considered bounded.
5. The 40% PMP antecedent storm does not result in any adverse concurrent site conditions.
6. Groundwater ingress due to PMF is considered an insignificant hazard for the JAF site.
7. Warning time for the beyond design basis flood events postulated in the FHRR is not credited or deemed necessary for the JAF FLEX Strategy because the FLEX Strategy can be implemented following a PMF event.
8. Significant plant preparation for the beyond design basis flood events postulated in the FHRR is not credited or deemed necessary at JAF for the FLEX strategy.
9. The PMF flood mechanism can cause certain areas along the deployment path from the “N+1” storage building to become inundated. The equipment stored in the “N+1” storage building is not the primary equipment for a Flood induced BDBEE and only serves as a backup capability to the “N” set of equipment. The primary storage location for a full “N” set of FLEX equipment is protected and deployable after an external flooding event. Therefore, the FLEX strategies are not affected by the PMF event and can be implemented successfully.
10. The time to recession at various doors to buildings is provided in Appendix B of the FHRR and was considered in the FLEX DB. No adverse impacts to SSC’s is noted.

FLEX Design Basis and MSFHI – Flood Parameter Comparison Tables

Table 3 – Storm Surge

Flood Scenario Parameter		Plant Current Design Basis Flood Hazard	FLEX Design Basis Flood Hazard	MSFHI Storm Surge	Bounded (B) / Not Bounded (NB) by FLEX DB
Flood Level and Associated Effects	1. Max Stillwater (PMSS) Elevation (ft. USLS35)	254.1	272.8	252.8 See Note 1	B
	2. Max Wave Run-up Elevation (ft. USLS35)	262	Not Identified	268.0 See Note 1,2	B
	3. Max Hydrodynamic/Debris Loading (psf)	Not identified in the CDB	N/A	N/A See Note 1	B
	4. Effects of Sediment Deposition/Erosion	Not identified in the CDB	N/A	N/A See Note 1	B
	5. Other Associated effects (identify each effect)	N/A	N/A	N/A See Note 1	B
	6. Concurrent Site Conditions	Not identified in the CDB	N/A	N/A See Note 1	B
	7. Effects on Groundwater	Not identified in the CDB	N/A	N/A See Note 1	B
Flood Event Duration	8. Warning Time (hours)	Not identified in the CDB.	Not identified	N/A See Note 1	B
	9. Period of Site Preparation (hours)	Not identified in the CDB	Not identified	N/A See Note 1	B
	10. Period of Inundation (hours)	Not identified in the CDB	No Impact	N/A See Note 1	B
	11. Period of Recession (hours)	Not identified in the CDB	Not identified	N/A See Note 1	B
Other	12. Plant Mode of Operations	Normal Operations	Normal Operations	Normal Operations	B
	13. Other Factors	N/A	N/A	N/A	N/A

N/A = Not Applicable

Additional notes and explanations regarding the bounded/non-bounded determination:

1. The resulting maximum wave run-up flood elevation is six (6) ft higher than the controlling CDB Lake Ontario flood hazard elevation. However, the resulting flood elevation is four (4) ft below general site grade of 272 ft USLS35, and as a result the corresponding associated effects and flood event duration parameters are not applicable. SSCs important to safety and the FLEX strategy at JAF are not impacted.
2. Note that after the issuance of the FitzPatrick's FHRR (Reference 2) the International Joint Commission (IJC) issued new orders and directions under 'Regulation Plan 2014' for controlling the discharge of waters from Lake Ontario and the St. Lawrence River; the orders were made effective December 8, 2016.

   The orders on Lake Ontario lake level now and in the future, would impact initial stillwater level inputs in the FHRR. As the analysis performed for FitzPatrick's FHRR represent a snapshot in time, reanalysis was not performed, nor would such analysis impact the FHRR results in a meaningful way. Since the

stillwater elevation would have increased by 1 ft. to 249.0 ft. from 248.0 ft. The revised stillwater elevation would result in a new freeboard (margin) of 3 ft. Furthermore, as discussed in Section 3.4.2.4 of the FHRR, the storm surge (generated by the Probable Maximum Wind Storm (PMWS) is "an extra-tropical storm which would occur during the winter months when the regulated level is not exceeded". The initial stillwater level input in the FHRR is exceeded only during non-winter months. Therefore, the conclusion that margin to site grade is adequate, protection features are reliable, and FLEX strategy is feasible remains valid.

References:

1. NRC letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, ML12056A046, dated March 12, 2012
2. Entergy letter, Flood Hazard Reevaluation Report - Response NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, JAFP-15-0036, dated March 12, 2015
3. NEI document, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 2, NEI 12-06, dated December 2015
4. NRC interim staff guidance, Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events, Revision 1, JLD-ISG-2012-01, dated January 22, 2016
5. NRC letter, James A. FitzPatrick Nuclear Power Plant – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (TAC No. MF6106), ML15238B537, dated September 4, 2015
6. NRC letter, Supplemental Information Related to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Flooding Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, ML13044A561, dated March 1, 2013
7. NRC letter, James A. FitzPatrick Nuclear Power Plant – Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation (TAC No. MF6106), ML17067A469, dated March 27, 2017