

NEI 12-06, Revision 1

Public Meeting
September 9, 2015

NEI 12-06, Revision 1

- NEI 12-06, Revision 1 addresses:
 - Changes to incorporate NRC-approved alternatives
 - Generic issue position papers
 - Frequently asked questions
 - Appendix G- mitigating strategies assessment for the reevaluated flood hazard information
 - Appendix E- validation guidance

Appendix G

- Comment: Explain what acceptance criteria would be applied for an Alternate Mitigating Strategy (AMS) or Targeted Hazard Mitigating Strategy (THMS)
- Response: The example below shows how the acceptance criteria of applicable sections of NEI 12-06 would be applied
- Comment: THMS should be used only if an AMS is not reasonable
- Response: Added guidance that a THMS should be used only if it is not reasonable to develop an AMS

Appendix G

- Comment: Define the “codes and standards” in Section G.5
- Response: Reference to “appropriate codes and standards” is necessary to allow plants to use the specific codes and standards for their site to assess the robustness of flood protection features.

Appendix G

- Comment: Need to document if the FLEX capability is maintained for each applicable flood mechanism
- Response: Guidance in Section G.3 was modified to document for which flood mechanisms the FLEX DB bounds/or does not bound the MSFHI

Appendix G

- Comment: For AMS/THMS an effort should be made to preserve the use of the on-site FLEX equipment that is not used in the strategy to provide additional capability
- Response: Added guidance in Section G.4.3 that FLEX equipment not used in an AMS/THMS should have actions taken, if practicable, to preserve N sets for possible later use

Appendix G

- In order to provide additional potential mitigation capability, portable FLEX equipment not being used in the performance of the AMS strategy should be preserved for use as follows:
 - Take action to preserve N sets of onsite FLEX equipment from the MSFHI in accordance with Section 11.3.3.
 - This action applies only if there is sufficient warning time to allow this action to be taken and does not distract from the deployment of the AMS/THMS.
 - No strategies need to be preplanned for the preserved equipment.
 - Extraordinary measures do not need to be taken to preserve the unused equipment.
 - Examples of equipment preservation could include storage in the current storage location, relocation to an area not impacted by the MSFHI, etc.
- Maintain the capability to obtain additional portable FLEX equipment from offsite sources.
 - No strategies need to be preplanned for the use of the offsite equipment.

Appendix E

- Comment: Appendix E is not applicable to AMS/THMS because of the inherent FLEX attributes considered in Appendix E that may not be applicable to equipment for AMS/THMS
- Response: Appendix G stipulates that equipment used for AMS/THMS would be considered FLEX equipment and, as such, would be designed and implemented to the same standards as FLEX equipment

Appendix E

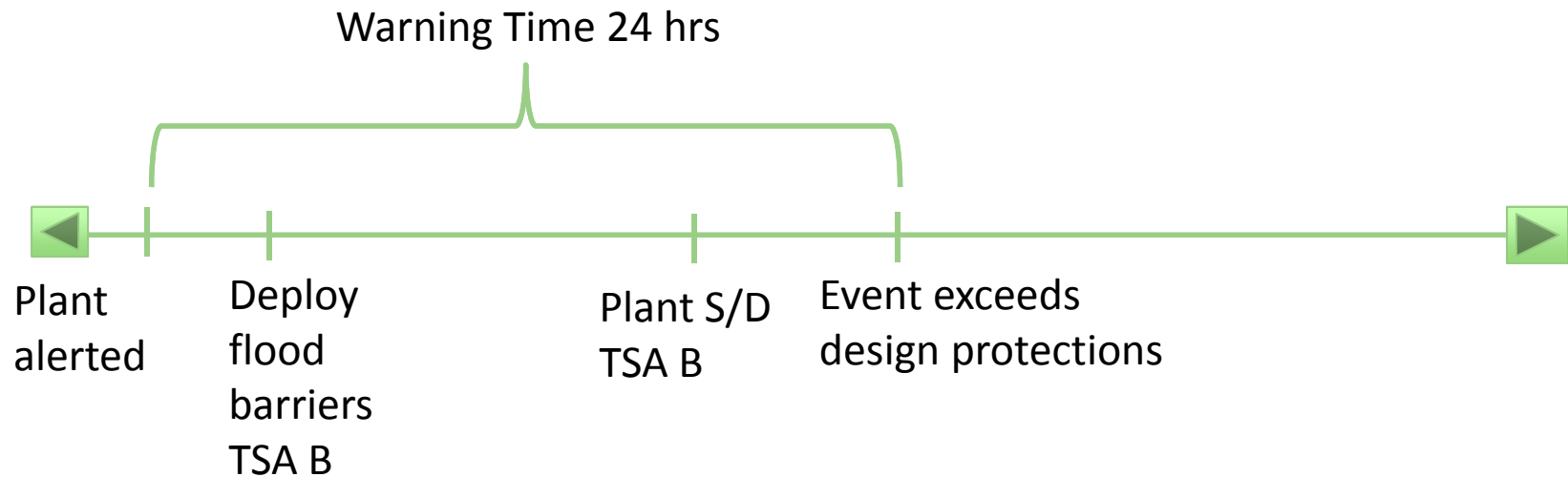
- Comment: Remove references to “reliability.”
- Response: References to reliability have been removed.
- Comment: Define $t=0$
- Response: For a plant relying on warning time, $t=0$ would have to be defined in their sequence of events as it is one of the endpoints that defines warning time. It is not necessary to have a standard definition since warning time will be delineated in the event sequence of events.

Appendix E

- Comment: Anticipatory actions greater than 24 hours in advance of the event would be exempt from validation.
- Response: All anticipatory actions will be considered in the validation process and reactive actions within 24 hours of the event.
- Comment: Need to address validation effort for actions governed by normal plant processes such as shutting down the reactor, etc.
- Response: Sections 6.3.1 and 6.3.2 for Level A/B records address how normal plant process validation may be credited.

Appendix E

- Comment: Discuss graded validation approach



Appendix E

- Level A: TSAs for events where warning time is 6 hours or less.
- Level B: TSAs for events where warning time is 24 hours or less.
- Level C: TSAs for events where warning time is greater than 24 hours.

Example

- The MSFHI is not bounded by the flood information used for the original FLEX implementation in that the combined effects of surge plus wind/wave results in levels 1.3 ft higher.
- Diesel building doors challenged by the MSFHI impacts.
- FLEX equipment is protected from the flooding levels (stored equipment and connection points) but cannot be deployed without modification due to deployment locations being inundated by the flood.
- Licensee can modify the FLEX deployment locations to allow FLEX to work or protect the plant equipment from the flood. The licensee determines that it is more effective to install flood barriers to provide protection for plant equipment. This is an AMS (Section G.4.3) since ELAP/LUHS will not be assumed.

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- G.2- Characterizes the reevaluated flood hazard (MSFHI)
- G.3- Compares MSFHI to the flood hazard used in FLEX implementation
 - Determines for which affected flood mechanisms FLEX remains deployable
 - Determines which flood mechanisms are not bounded by the FLEX flood hazard

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- G.4.1- Determines if FLEX is deployable for the MSFHI that exceeds the FLEX flood hazard, if not then 3 options are available:
 - G.4.2- Modify FLEX
 - G.4.3- Develop an Alternate Mitigating Strategy (AMS)
 - Uses the flood as the initiating event (not ELAP/LUHS)
 - G.4.4- Develop a Targeted Hazard Mitigation Strategy (THMS)
 - If an AMS is not reasonable

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- AMS or THMS:
 - Uses any combination of plant equipment or FLEX equipment (including protective barriers)
 - Uses a sequence of events with the flood as the initiating event (as opposed to ELAP/LUHS)
 - Portable equipment used will be considered FLEX equipment and subject to the same guidance
 - Common connections, placards, color coded connections
 - Validation guidance applies

Section G.4.3

The MSA should address the following:

- The sequence of events should be established based on the flood as the initiating event.
 - If warning time is available, the AMS sequence of events should include the basis for the warning time allowance.
- The MSA should use the General Criteria and Baseline Assumptions in Section 3.2.1.
- The impacts of the MSFHI should be used in place of the FLEX DB flood to perform the screening and evaluation per Section 6.

Section 6

- The impacts of the MSFHI should be used in place of the FLEX DB flood to perform the screening and evaluation per Section 6.
 - Susceptibility to external flooding
 - Characterization of the applicable flood hazards
 - Warning time- the time from when the flood is known to present a threat to the plant (plant is alerted) and the time the flood level could exceed the design protections ($t=0$).
 - Protection and deployment of AMS

Section 6

- Protection and deployment of AMS
 - Protection of equipment relied on for AMS
 - Deployment of equipment relied on for the AMS
 - Procedures and their interfaces
 - Consideration of use of equipment from offsite

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- AMS or THMS are evaluated against the General Criteria and Baseline Assumptions in Section 3.2.1
 - **3.2.1.2 Initial Plant Conditions**
 - 3.2.1.2.1- Prior to the event the reactor has been operating at 100 percent rated thermal power for at least 100 days or has just been shut down from such a power history as required by plant procedures in advance of the impending event.
 - 3.2.1.2.2- At the time of the postulated event, the reactor and supporting systems are within normal operating ranges for pressure, temperature, and water level for the appropriate plant condition.

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- AMS or THMS are evaluated against the General Criteria and Baseline Assumptions in Section 3.2.1
 - **3.2.1.3 Initial Conditions**
 - 3.2.1.3.1- No specific initiating event is used. The initial condition is assumed to be a loss of off-site power (LOOP) at a plant site resulting from an external event that affects the off-site power system either throughout the grid or at the plant with no prospect for recovery of off-site power for an extended period. The LOOP is assumed to affect all units at a plant site.

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- AMS or THMS are evaluated against the General Criteria and Baseline Assumptions in Section 3.2.1
 - **3.2.1.3 Initial Conditions**

3.2.1.3.2- All design basis installed sources of emergency on-site ac power and SBO alternate ac power sources are assumed to be not available and not imminently recoverable. Station batteries and associated dc buses along with ac power from buses fed by station batteries through inverters remain available.

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- AMS or THMS are evaluated against the General Criteria and Baseline Assumptions in Section 3.2.1

- **3.2.1.3 Initial Conditions**

- 3.2.1.3.3- Cooling and makeup water inventories contained in systems or structures with designs that are robust for the applicable hazard(s) are available.

- 3.2.1.3.4- Normal access to the ultimate heat sink is lost.

- 3.2.1.3.5- Fuel for FLEX equipment stored in structures with designs which are robust for the applicable hazard(s) remains available.

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- AMS or THMS are evaluated against the General Criteria and Baseline Assumptions in Section 3.2.1
 - 3.2.1.4 Reactor Transient
 - 3.2.1.5 Reactor Coolant Inventory Loss
 - 3.2.1.6 SFP Conditions
 - 3.2.1.7 Event Response Actions
 - 3.2.1.8 Effects of Loss of Ventilation
 - 3.2.1.9 Personnel Accessibility

Appendix G- Mitigating Strategies Assessment for the Reevaluated Flood Hazard Information

- AMS or THMS:
 - Evaluates the applicability of the Minimum Baseline Capabilities in Section 3.2.2
 - Establishes reasonable protection for FLEX equipment in accordance with Section 6
 - FLEX equipment not being used in the performance of the AMS strategy should have actions taken to preserve N sets from the MSFHI in accordance with Section 11.3.3.
- THMS
 - Would allow containment capability to not be maintained
 - Used only if AMS not reasonable

G.4.1 Example Site Description

- River site
- PMF driven by spring storm over 100 yr snowpack
- Approximately 12 days warning time
- Site grade flooded for approximately 13 days

Protection Strategy

- SSCs protected via permanent features (flood walls built into plant design)
- 17 openings sealed in anticipation of flood level by either sealing/reinforcing existing doors or installation of pre-stage flood panels
- Protective actions triggered based on National Weather Service three day flood predictions
- Existing flood protection actions previously proceduralized and validated

Protective Action Triggers

(NOTE: all elevations normalized to site grade = 0 feet)

- Site Chemistry monitors NWS three day predictions using existing procedure
- Actions include physical preparations, notifications, and implementation of site Emergency Plan
- Trigger point based on 3 day predictions of -15, -12, -10, -7, -5 and – 3 feet
- At time of actual flooding event (i.e., 0 feet), all protective actions have been fully implemented
- Offsite power available until +3 feet

Example Triggers/Action

3 day predicted level (feet)	Major Actions
-15	Increased monitoring, equipment operability verified, notifications made
-12	Cooling tower shutdown, miscellaneous equip staged
-10	Fuel tanks filled, actions to facilitate site access initiated
-7	Actions to protect miscellaneous plant equipment, SAFER activated
-3	NUE Declared, Unit is placed in cold shutdown, flood panels installed to seal buildings, substation actions to extend offsite power to +3 ft, FLEX equipment pre-staged
0	Site grade level reached.
3	Alert Declared Offsite power expected to be lost
8.6	Maximum flood level

FLEX Deployment – Flood

- Portable FLEX equipment will be pre-staged in flood protected areas of building (e.g., turbine deck)
- SAFER activated based on expected loss of offsite power
- Existing flood response procedure modified to implement pre-staging of portable equipment
- FLEX implemented if and when ELAP occurs
- FLEX prestaging and deployment will be validated per Appendix E