

September 10, 2013

MEMORANDUM TO: Matthew A. Mitchell, Chief
Projects Management Branch
Japan Lessons Learned Project Directorate
Office of Nuclear Reactor Regulation

FROM: Christopher B. Cook, Chief */RA/*
Hydrology and Meteorology Branch
Division of Site Safety and Environmental Analysis
Office of New Reactors

SUBJECT: TEMPLATE FOR STAFF ASSESSMENT OF RESPONSE TO
10 CFR 50.54(f) INFORMATION REQUEST – FLOODING
MECHANISMS

Enclosed are templates staff will be using to document its review of licensee responses to the March 12, 2012, 10 CFR 50.54(f), Enclosure 2, information requests associated with the reevaluation of flood-causing mechanisms.

The templates use the following color scheme:

- Grey highlighted text is instruction to the reviewer and should be deleted from the final.
- Yellow highlighted text is data that the reviewer should fill in from the FHRR
- Green highlighted text is sample language that should be deleted from the final.
- Text not highlighted should not be changed unless necessary.

Enclosures:

1. Template for letters from the DORL PM to the licensee
2. Template for the staff's assessment

CONTACT: Christopher Cook, NRO/DSEA
301-415-6397

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RidsNroDsea Resource	MBensi
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ADAMS Accession No. 13218A150

**via email*

OFFICE	LA:NRR/JLD*	NRO/DSEA/RHMB	NRO/DSEA/RHMB	NRO/DSEA/RHMB	NRO/DSEA
NAME	SLent	MMcBride	MBensi	CCook	SFlanders (NChokshi for)
DATE	08/06/2013	08/16/2013	08/16/2013	08/15/201	08/15/2013
OFFICE	OGC (NLO)*	JLD/PMB/PM*	NRO/DSEA/RHMB		
NAME	BMizuno	GEMiller	CCook		
DATE	08/29/2013	09/06/2013	09/10/2013		

OFFICIAL RECORD COPY

[Addressee]

SUBJECT: [Plant Name] – STAFF ASSESSMENT OF RESPONSE TO 10 CFR 50.54(f)
INFORMATION REQUEST – FLOOD-CAUSING MECHANISM REEVALUATION

Dear [Name]:

By letter dated March 12, 2012, the U.S. Nuclear Regulatory Commission (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). 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.

By letter dated [Month Day, Year], [Licensee Name] responded to this request for [Site]. [If no supplementary letter, then delete the following sentence.] In response to NRC staff questions, this response was supplemented by letter(s) dated [Month Day, Year].

The NRC staff has reviewed the information provided and, as documented in the enclosed staff assessment, determined that you provided sufficient information in response to the 50.54(f) letter. This closes out the NRC's efforts associated with TAC No.(s) [MEXXXX]. [If integrated assessment required, use the following sentence; if not, then delete.] Because the reevaluated flood-causing mechanism was not bounded by your current plant-specific design basis hazard, the NRC staff anticipates submittal of an Integrated Assessment in accordance with Enclosure 2, Required Response 3, of the 50.54(f) letter no more than 2 years from the date you submitted the Flood Hazard Reevaluation Report. If you have any questions, please contact me at (301) 415-XXXX.

Sincerely,

[Plant PM Name], Project Manager
Plant Licensing Branch [XX]
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-[XXX]

Enclosure:
Staff Assessment of Flood Hazard Reevaluation Report

cc w/encl: Distribution via Listserv

Enclosure 1

[Addressee]

SUBJECT: [Plant Name] – STAFF ASSESSMENT OF RESPONSE TO 10 CFR 50.54(f)
INFORMATION REQUEST – FLOOD-CAUSING MECHANISM REEVALUATION

Dear [Name]:

By letter dated March 12, 2012, the U.S. Nuclear Regulatory Commission (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). 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.

By letter dated [Month Day, Year], [Licensee Name] responded to this request for [Site]. [If no supplementary letter, then delete the following sentence.] In response to NRC staff questions, this response was supplemented by letter(s) dated [Month Day, Year].

The NRC staff has reviewed the information provided and, as documented in the enclosed staff assessment, determined that you provided sufficient information in response to the 50.54(f) letter. This closes out the NRC's efforts associated with TAC No[(s)] [MEXXXX]. [If integrated assessment required, use the following sentence; if not, then delete.] Because the reevaluated flood-causing mechanism was not bounded by your current plant-specific design basis hazard, the NRC staff anticipates submittal of an Integrated Assessment in accordance with Enclosure 2, Required Response 3, of the 50.54(f) letter no more than 2 years from the date you submitted the Flood Hazard Reevaluation Report. If you have any questions, please contact me at (301) 415-XXXX.

Sincerely,

[Plant PM Name], Project Manager
Plant Licensing Branch [XX]
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-[XXX]

Enclosure:
Staff Assessment of Flood Hazard Reevaluation Report

cc w/encl: Distribution via Listserv

ADAMS Accession No.: ML

*via email

OFFICE	NRO/DSEA/RHMB	NRO/DSEA/RHMB	NRO/DSEA/RHMB	NRO/DSEA	DORL/LPL[XX]/PM
NAME	[RHMB Inland Lead]	[RHMB Coastal Lead]	CCook	NChokshi	
DATE					
OFFICE	DORL/LPL[XX]/PM	JLD/PMB/PM	OGC	DORL/LPL[XX]/BC	
NAME		GEMiller			
DATE					

OFFICIAL RECORD COPY

STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO FLOODING HAZARD REEVALUATION REPORT

[Plant Name], UNIT NO. [X]

DOCKET NO. 50-[XXX]

1.0 INTRODUCTION

By letter dated March 12, 2012, 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)1 “Conditions of license” (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 Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident.² The NRC Near-Term Task Force (NTTF) Recommendation 2.1, and subsequent Staff Requirements Memoranda (SRMs) associated with Commission Papers SECY-11-0124³ and SECY-11-0137⁴, instructed the NRC staff to issue requests for information to licensees pursuant to 10 CFR 50.54(f).

Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazard for their respective sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits (ESPs) and combined licenses (COLs). The required response section of Enclosure 2 specified that NRC staff would provide a prioritization plan indicating Flooding Hazard Reevaluation Report (FHRR) deadlines for individual plants. The staff issued a letter providing the prioritization of the FHRRs on May 11, 2012.⁵

Upon completion of the licensee’s hazard review, if the reevaluated hazard for all flood-causing mechanisms is not bounded by the current plant design basis flood hazard, an Integrated Assessment will be necessary. The FHRR and the responses to the associated Requests for Additional Information (RAIs) will provide the hazard input necessary to complete the Integrated Assessment report as described in Japan Lessons-Learned Project Directorate interim staff guidance (JLD-ISG) JLD-ISG-2012-05, “Guidance for Performing the Integrated Assessment for External Flooding.”⁶

-
- 1 The 50.54(f) letter is available in the Agencywide Documents Access and Management System (ADAMS) using Accession No. ML12053A340.
 - 2 The Near-term Task Force Review of Insights from the Fukushima Dai-ichi Accident is available using ADAMS Accession No. ML111861807
 - 3 SECY-11-0124 is available using ADAMS Accession No. ML11245A158.
 - 4 SECY-11-0137 is available using ADAMS Accession No. ML11272A111.
 - 5 The NRC prioritization letter is available using ADAMS Accession No. ML12097A510
 - 6 JLD-ISG-2012-05 is available using ADAMS Accession No. ML12311A214.

Enclosure 2

[FOR USE WHEN NO INTERIM ACTIONS NECESSARY]

By letter dated [Month Day, Year],⁷ [Licensee Name] provided the FHRR for [Site]. The licensee did not identify any interim actions. [If no supplementary letter, then delete the following sentence.] The licensee supplemented the FHRR by letter(s) dated [Month Day, Year].⁸

--- OR ---

[FOR USE WHEN INTERIM ACTIONS ARE NECESSARY]

By letter dated [Month Day, Year],⁹ [Licensee Name] provided the FHRR for [Site]. [If no supplementary letter, then delete the following sentence.] The FHRR was supplemented by letter(s), including RAI responses, dated [Month Day, Year].¹⁰ In connection with these responses, the licensee identified certain interim actions. The staff prepared a separate staff assessment report, dated [Month Day, Year]¹¹ to document its review of the interim actions.

The staff also prepared a separate staff assessment report to document its review of the flooding walkdowns.¹² For sites performing an Integrated Assessment, the staff will prepare an additional staff assessment report to document its review.

2.0 REGULATORY BACKGROUND

2.1 Applicable Regulatory Requirements

This section describes present-day regulatory requirements that are applicable to the FHRR. Section 50.34(a)(1), (a)(3), (a)(4), (b)(1), (b)(2), and (b)(4), of 10 CFR, describes the required content of the preliminary and final safety analysis reports, including a discussion of the facility site with a particular emphasis on the site evaluation factors identified in 10 CFR Part 100. The licensee should provide any pertinent information identified or developed since the submittal of the preliminary safety analysis report in the final safety analysis report.

Section 50.54(f) of 10 CFR states that a licensee shall at any time before expiration of its license, upon request of the Commission, submit written statements, signed under oath or affirmation, to enable the Commission to determine whether or not the license should be modified, suspended, or revoked. The 50.54(f) letter of March 12, 2012 requested licensees reevaluate the flood-causing mechanisms for their respective sites using present-day methodologies and regulatory guidance used by the NRC for the ESP and COL reviews.

General Design Criterion 2 in Appendix A of Part 50 states that structures, systems, and components (SSCs) important to safety at nuclear power plants must be designed to withstand

7 The letter dated [Month Day, Year] is available under ADAMS Accession No. ML[XXXXXX].

8 The supplement dated [Month Day, Year] is available under ADAMS Accession No. ML[XXXXXX].

9 The letter dated [Month Day, Year] is available under ADAMS Accession No. ML[XXXXXX].

10 The supplement dated [Month Day, Year], is available under ADAMS Accession No. ML[XXXXXX].

11 The staff assessment report for the interim actions is available using ADAMS Accession No. ML[XXXXXX].

12 The staff assessment report for the flooding walkdowns is available using ADAMS Accession No. ML[XXXXXX].

the effects of natural phenomena such as earthquakes, tornados, hurricanes, floods, tsunamis, and seiches without loss of capability to perform their intended safety functions. The design bases for these SSCs are to reflect appropriate consideration of the most severe of the natural phenomena that have been historically reported for the site and surrounding area. The design bases are also to have sufficient margin to account for the limited accuracy, quantity, and period of time in which the historical data have been accumulated.

Section 50.2 of 10 CFR defines the design basis as the information that identifies the specific functions that an SSC of a facility must perform, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design which each licensee is required to develop and maintain. These values may be (a) restraints derived from generally accepted "state of the art" practices for achieving functional goals, or (b) requirements derived from an analysis (based on calculation or experiments or both) of the effects of a postulated accident for which an SSC must meet its functional goals.

Section 54.3 of 10 CFR defines the "current licensing basis" (CLB) as: "the set of NRC requirements applicable to a specific plant and a licensee's written commitments for ensuring compliance with and operation within applicable NRC requirements and the plant-specific design basis (including all modifications and additions to such commitments over the life of the license) that are docketed and in effect." This includes 10 CFR Parts 2, 19, 20, 21, 26, 30, 40, 50, 51, 52, 54, 55, 70, 72, 73, 100 and appendices thereto; orders; license conditions; exemptions; and technical specifications as well as the plant-specific design-basis information as documented in the most recent final safety analysis report. The licensee's commitments made in docketed licensing correspondence, which remain in effect, are also considered part of the CLB.

Present-day regulations for reactor site criteria (Subpart B to 10 CFR Part 100 for applications on or after January 10, 1997) state, in part, that the physical characteristics of the site must be evaluated and site parameters established such that potential threats from such physical characteristics will pose no undue risk to the type of facility proposed to be located at the site. Factors to be considered when evaluating sites include the nature and proximity of dams and other man-related hazards (10 CFR 100.20(b)) and the physical characteristics of the site, including the hydrology (10 CFR 100.21(d)).

2.2 Enclosure 2 to the 50.54(f) Letter

The 50.54(f) letter requests all power reactor licensees and construction permit holders reevaluate all external flooding-causing mechanisms at each site. The reevaluation should apply present-day methods and regulatory guidance that are used by the NRC staff to conduct ESP and COL reviews. This includes current techniques, software, and methods used in present-day standard engineering practice. If the reevaluated flood-causing mechanisms are not bounded by the current plant design basis flood hazard, an Integrated Assessment will be necessary.

Flood-Causing Mechanisms

Attachment 1 to Recommendation 2.1, Flooding (Enclosure 2 of the 50.54(f) letter) discusses flood-causing mechanisms for the licensee to address in the FHRR. Table 1 lists the flood-causing mechanisms the licensee should consider. Table 1 also lists the corresponding

SRP section(s) and applicable JLD-ISGs containing acceptance criteria and review procedures. The licensee should incorporate and report associated effects (per JLD-ISG-2012-05) in addition to the maximum water level associated with each flood-causing mechanism.

Table 1: Flood-Causing Mechanisms and Corresponding Guidance

Flood-Causing Mechanism	SRP Section(s) and JLD-ISG
Local Intense Precipitation and Associated Drainage	SRP 2.4.2 SRP 2.4.3
Streams and Rivers	SRP 2.4.2 SRP 2.4.3
Failure of Dams and Onsite Water Control/Storage Structures	SRP 2.4.4 JLD-ISG-2013-01
Storm Surge	SRP 2.4.5 JLD-ISG-2012-06
Seiche	SRP 2.4.5 JLD-ISG-2012-06
Tsunami	SRP 2.4.6 JLD-ISG-2012-06
Ice-Induced	SRP 2.4.7
Channel Migrations or Diversions	SRP 2.4.9

Associated Effects

In reevaluating the flood-causing mechanisms, the “flood height and associated effects” should be considered. The ISG for performing the Integrated Assessment for external flooding defines “flood height and associated effects” as the maximum stillwater surface elevation plus

- wind waves and run-up effects
- hydrodynamic loading, including debris
- effects caused by sediment deposition and erosion
- concurrent site conditions, including adverse weather conditions
- groundwater ingress
- other pertinent factors

Combined Effect Flood

The worst flooding at a site that may result from a reasonable combination of individual flooding mechanisms is sometimes referred to as a “Combined Effect Flood.” Even if some or all of these individual flood-causing mechanisms are less severe than their worst-case occurrence, their combination may still exceed the most severe flooding effects from the worst-case occurrence of any single mechanism in the 50.54(f) letter. (See NUREG-0800, Standard Review Plan (SRP) Section 2.4.2, Area of Review 9.¹³) Attachment 1 of the 50.54(f) letter describes the “Combined Effect Flood” as defined in ANS 2.8-1992 as follows:

For flood hazard associated with combined events, American Nuclear Society (ANS) 2.8-1992 provides guidance for combination of flood causing mechanisms for flood hazard at nuclear power reactor sites. In addition to those listed in the ANS guidance, additional plausible combined events should be considered on a site specific basis and should be based on the impacts of other flood causing mechanisms and the location of the site.

If two less severe mechanisms are plausibly combined (per ANS 2.8 and SRP Section 2.4.2, Areas of Review 9), then the staff will document and report the result as part of one of the hazard sections. An example of a situation where this may occur is flooding at a riverine site located where the river enters the ocean. For this site, storm surge and river flooding should be plausibly combined.

Flood Event Duration

Flood event duration was defined in the ISG for the Integrated Assessment as the length of time during which the flood event affects the site. It begins when conditions are met for entry into a flood procedure, or with notification of an impending flood (e.g., a flood forecast or notification of dam failure), and includes preparation for the flood. It continues during the period of inundation, and ends when water recedes from the site and the plant reaches a safe and stable state that can be maintained indefinitely. Figure 1 illustrates flood event duration.

13 Section 2.4.2 is available using ADAMS Accession No. ML070100647

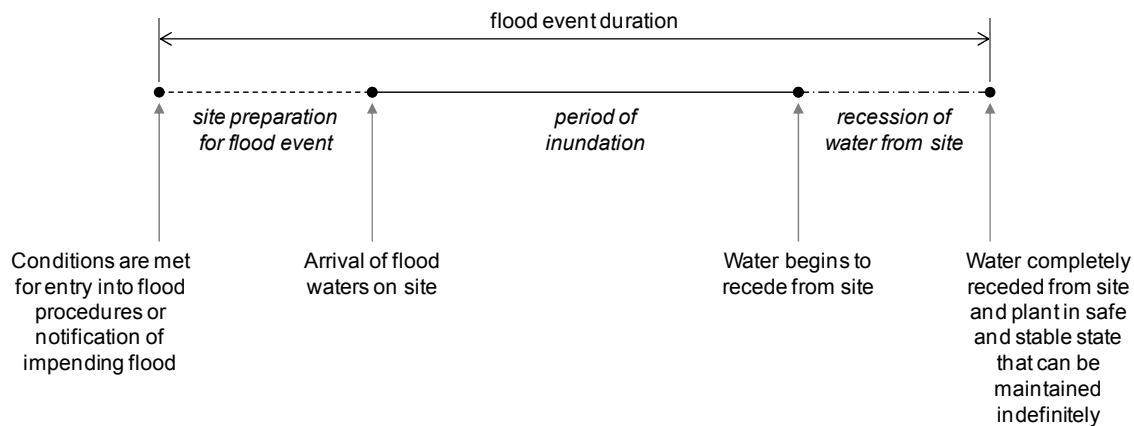


Figure 1: Flood Event Duration

Actions Following the FHRR

For the sites where the reevaluated flood hazard is not bounded by the current design basis flood hazard for all flood-causing mechanisms, the 50.54(f) letter requests licensees and construction permit holders to

- Submit an Interim Action Plan with the FHRR documenting actions planned or already taken to address the reevaluated hazard
- Perform an Integrated Assessment subsequent to the FHRR to (a) evaluate the effectiveness of the current licensing basis (i.e., flood protection and mitigation systems), (b) identify plant-specific vulnerabilities, and (c) assess the effectiveness of existing or planned systems and procedures for protecting against and mitigating consequences of flooding for the flood event duration

If the reevaluated flood hazard is bounded by the current design basis flood hazard for all flood-causing mechanisms at the site, licensees are not required to perform an Integrated Assessment at this time.

3.0 TECHNICAL EVALUATION

The NRC staff has reviewed the information provided for the flood hazard re-evaluation of [Plant Name], Unit No[s]. The licensee [conducted/did not conduct] the hazard reevaluation using present-day methodologies and regulatory guidance used by the NRC staff in connection with ESP and COL reviews. The staff's review and evaluation is provided below.

The site grade at the powerblock is elevation [XX.YY ft] [VERTICAL DATUM]. Table 2 provides the summary of controlling reevaluated flood-causing mechanisms, including associated effects, the licensee computed to be higher than the powerblock elevation.

[Note: Elevation of flooding from local intense precipitation will be reported for every site.]

Table 2: Summary of Controlling Flood-Causing Mechanisms

Reevaluated Flood-Causing Mechanisms and Associated Effects that May Exceed the Powerblock Elevation*	ELEVATION (ft, DATUM)
Local Intense Precipitation and Associated Drainage	XX.YY
[Delete any non-controlling hazards below: the summary table is for the powerblock.]	
Streams and Rivers	
Failure of Dams and Onsite Water Control/Storage Structures	
Storm Surge	
Seiche	
Tsunami	
Ice-Induced	
Channel Migrations or Diversions	

*Flood Height and Associated Effects as defined in JLD-ISG-2012-05.

3.1 Site Information

The 50.54(f) letter includes the SSCs important to safety, and the Ultimate Heat Sink (UHS), in the scope of the hazard reevaluation. Per the 50.54(f) letter, Enclosure 2, Requested Information, Hazard Reevaluation Report, Item a, the licensee included pertinent data concerning these SSCs in the FHRR.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via the electronic reading room: [LIST INFORMATION REVIEWED].

The staff requested additional information from the licensee to supplement the FHRR. The licensee provided this additional information at the following ADAMS accession numbers [LIST ML NUMBERS] which is discussed in the appropriate section(s) below.

The 50.54(f) letter, Enclosure 2 (Recommendation 2.1: Flooding), Requested Information, Hazard Reevaluation Report, Item a, describes site information to be contained in the FHRR. The staff reviewed and summarized this information as follows.

Detailed Site Information

[Summarize the site information provided by the licensee (both designed and as-built), including present-day site layout, elevation of pertinent SSCs important to safety, and site topography, as well as pertinent spatial and temporal data sets. This can be found in the following sections of the hazard report, figures, RAI responses, etc. Provide the ADAMS ML number in the references.]

Design Basis (DB) Flood Hazards

[Fill out the table with information as reported by the licensee for all flood-causing mechanisms. Include figures as appropriate. Sample entries for streams and rivers and storm surge are shown to clarify contents of the table.]

Table 3: Design Basis (DB) Flood Hazard

Flooding Mechanism	DB Still-Water Level (ft DATUM)	DB Associated Effects (ft) [state the effect]	Current DB Flood Level (ft DATUM) [Value or state 'Not Discussed in CDB']	Reference
Local Intense Precipitation and Associated Drainage	X.X	Y.Y	Sum of X.X+Y.Y=Z.Z	List the FHRR section or RAI response
Streams and Rivers	Not Discussed in CDB	Not Discussed in CDB	Not Discussed in CDB	
Failure of Dams and Onsite Water Control/Storage Structures				
Storm Surge	[20.0, including tides]	[5.1 due to wave run-up]	[25.1]	
Seiche				
Tsunami				
Ice-Induced				
Channel Migrations or Diversions				

Flood-related Changes to the Licensing Basis

Describe changes, including any flood protection changes (including mitigation), since license issuance.

Changes to the Watershed and Local Area

Describe changes to watershed and local area since issuance.

Current Licensing Basis Flood Protection and Pertinent Flood Mitigation Features

Describe the CLB information the licensee provided in the FHRR.

Additional Site Details to Assess the Flood Hazard

This may include bathymetry or other available data the applicant provided or discussed.

Results of Plant Walkdown Activities

The 50.54(f) letter, Requested Information Item 1.c and Attachment 1 to Enclosure 2, Step 6, asks the licensee to report any relevant information from the results of the plant walkdown activities associated with Enclosure 4. The licensee described the following:

[Staff to summarize the walkdown activity results, including a reference to the staff assessment for walkdowns if appropriate. Make sure any flood protection or procedural changes are captured and accurately characterized.]

3.2 Local Intense Precipitation and Associated Site Drainage

The licensee reported in the FHRR that the reevaluated flood hazard, including associated effects, for local intense precipitation is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If not part of current design basis, then delete the following sentence, and state that site drainage was not considered as part of initial licensing.] The current design basis hazard for the local intense precipitation and associated site drainage hazard is [XX.Y] ft. DATUM.

[USE THE FOLLOWING TWO PARAGRAPHS IF NEEDED.]

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room: [LIST INFORMATION REVIEWED].

The staff requested additional information from the licensee to supplement the FHRR. The following ADAMS accession numbers [LIST ML NUMBERS] provide this additional information which is discussed below.

The staff reviewed the local intense precipitation and associated site drainage, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance.

[Staff to summarize the review and the evaluation of the licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence if there are IA-specific data for this mechanism.] The information on flooding from local intense precipitation and associated site drainage that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated flood hazard for local intense precipitation and associated site drainage is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated flood hazard for local intense precipitation and associated site drainage is not bounded by the current design basis flood

hazard; therefore, the licensee should include local intense precipitation and associated site drainage within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, or if local intense precipitation and associated site drainage were not considered during initial licensing, the situation will be handled on a case-by-case basis.]

3.3 Streams and Rivers

The licensee reported in the FHRR that the reevaluated hazard, including associated effects, for site flooding from stream and rivers is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If part of current design basis; if not, then delete the following sentence.] The current design basis hazard for site flooding from streams and rivers is [XX.Y] ft. DATUM.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room: [LIST INFORMATION REVIEWED].

The staff requested additional information from the licensee to supplement the FHRR. The licensee provided this additional information at the following ADAMS accession numbers [LIST ML NUMBERS] which is discussed below.

The staff describes its evaluation of site flooding from streams and rivers, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance below.

[Staff to summarize the review and the evaluation of licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence unless there are no IA-specific data for this mechanism.] The information on flooding from streams and rivers that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from streams and rivers is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from streams and rivers is not bounded by the current design basis flood hazard; therefore, the licensee should include flooding from streams and rivers within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

3.4 Failure of Dams and Onsite Water Control/Storage Structures

The licensee reported in the FHRR that the reevaluated hazard, including associated effects, for site flooding due to failure of dams and onsite water control/storage structures is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If part of current design basis; if not, then delete the following sentence.] The current design basis hazard for site flooding due to failure of dams and onsite water control/storage structures is [XX.Y] ft. DATUM.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room: [LIST INFORMATION REVIEWED].

The staff requested additional information from the licensee to supplement the FHRR. The following ADAMS accession numbers [LIST ML NUMBERS] provide this additional information which is discussed below.

The staff describes its evaluation of site flooding from failure of dams and onsite water control/storage structures, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance below.

[Staff to summarize the review and the evaluation of the licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence unless there are no IA-specific data for this mechanism.] The information on flooding from failure of dams and onsite water control/storage structures that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated flood hazard for failure of dams and onsite water control/storage structures is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated flood hazard for failure of dams and onsite water control/storage structures is not bounded by the current design basis flood hazard; therefore, the licensee should include failure of dams and onsite water control/storage structures within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

3.5 Storm Surge

The licensee reported in the FHRR that the reevaluated hazard, including associated effects, for site flooding due to storm surge is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If part of current design basis; if not, then delete

the following sentence.] The current design basis hazard for site flooding due to storm surge is [XX.Y] ft. DATUM.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room [LIST INFORMATION REVIEWED]

The staff requested additional information from the licensee to supplement the FHRR. The licensee provided this additional information at the following ADAMS accession numbers [LIST ML NUMBERS] which is discussed below.

The staff describes its evaluation of site flooding from storm surge, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance below.

[Staff to summarize the review and the evaluation of the licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence unless there are no IA-specific data for this mechanism.] The information on flooding from storm surge that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from storm surge is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from storm surge is not bounded by the current design basis flood hazard; therefore, the licensee should include flooding from storm surge within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

3.6 Seiche

The licensee reported in the FHRR that the reevaluated hazard, including associated effects, for site flooding due to seiche effects is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If part of current design basis; if not, then delete the following sentence.] The current design basis hazard for site flooding due to seiche effects is [XX.Y] ft. DATUM.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room [LIST INFORMATION REVIEWED]

The staff requested additional information from the licensee to supplement the FHRR. The licensee provided this additional information at the following ADAMS accession numbers [LIST ML NUMBERS] which is discussed below.

The staff describes its evaluation of site flooding from seiche, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance below.

[Staff to summarize the review and the evaluation of the licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence unless there are no IA-specific data for this mechanism.] The information on flooding from seiche that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from seiche is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from seiche is not bounded by the current design basis flood hazard; therefore, the licensee should include flooding from seiche within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

3.7 Tsunami

The licensee reported in the FHRR that the reevaluated hazard, including associated effects, for site flooding due to tsunami is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If part of current design basis; if not, then delete the following sentence.] The current design basis hazard for site flooding due to tsunami is [XX.Y] ft. DATUM.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room: [LIST INFORMATION REVIEWED].

The staff requested additional information from the licensee to supplement the FHRR. The licensee provided this additional information at the following ADAMS accession numbers [LIST ML NUMBERS] which is discussed below.

The staff describes its evaluation of site flooding from tsunami, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance below.

[Staff to summarize the review and the evaluation of the licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence unless there are no IA-specific data for this mechanism.] The information on flooding from tsunami that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from tsunami is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from tsunami is not bounded by the current design basis flood hazard; therefore, the licensee should include flooding from tsunami within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

3.8 Ice-Induced Flooding

The licensee reported in the FHRR that the reevaluated hazard, including associated effects, for ice-induced flooding of the site is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If part of current design basis; if not, then delete the following sentence.] The current design basis hazard for ice-induced flooding of the site is [XX.Y] ft. DATUM.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room: [LIST INFORMATION REVIEWED].

The staff requested additional information from the licensee to supplement the FHRR. The following ADAMS accession numbers [LIST ML NUMBERS] provide this additional information which is discussed below.

The staff describes its evaluation of ice-induced flooding of the site, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance below.

[Staff to summarize the review and the evaluation of the licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence unless there are no IA-specific data for this mechanism.] The information on flooding from

ice-induced flooding that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated hazard for ice-induced flooding of the site is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated hazard for ice-induced flooding of the site is not bounded by the current design basis flood hazard; therefore, the licensee should include ice-induced flooding within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

3.9 Channel Migrations or Diversions

The licensee reported in the FHRR that the reevaluated hazard, including associated effects, for site flooding due to channel migrations or diversions is [XX.Y] ft. DATUM. This flood-causing mechanism [is/is not] described in the licensee's current design basis. [If part of current design basis; if not, then delete the following sentence.] The current design basis hazard for site flooding due to channel migrations or diversions is [XX.Y] ft. DATUM.

In addition to the FHRR, the staff reviewed the following calculation packages and supplemental information via an electronic reading room: [LIST INFORMATION REVIEWED].

The staff requested additional information from the licensee to supplement the FHRR. The following ADAMS accession numbers [LIST ML NUMBERS] provide this additional information which is discussed below.

The staff describes its evaluation of site flooding from channel migrations or diversions, including associated effects, against the relevant regulatory criteria based on present-day methodologies and regulatory guidance below.

[Staff to summarize the review and the evaluation of the licensee information; this should be the bulk of the discussion.]

[Conclusion for this mechanism...put IA-specific data in Section 4. Use the following sentence unless there are no IA-specific data for this mechanism.] The information on flooding from channel migrations /diversions that is specific to the data needs of the Integrated Assessment is described in Section 4 of this staff assessment.

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from channel migrations or diversions is bounded by the current design basis flood hazard.

--- OR ---

The staff confirmed the licensee's conclusion that the reevaluated hazard for flooding from channel migrations or diversions is not bounded by the current design basis flood hazard; therefore, the licensee should include flooding from channel migrations or diversions within the scope of the Integrated Assessment.

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

4.0 INTEGRATED ASSESSMENT AND ASSOCIATED HAZARD DATA

[NO INTEGRATED ASSESSMENT NECESSARY]

The staff confirmed that the reevaluated hazard results for all reevaluated hazard mechanisms are bounded by the current design basis flood hazard. Therefore, the staff concludes that an Integrated Assessment is not necessary.

--- OR ---

[INTEGRATED ASSESSMENT IS NECESSARY]

The staff confirmed that the reevaluated hazard results for all reevaluated hazard mechanisms are not bounded by the current design basis flood hazard. Therefore, the staff concludes that an Integrated Assessment is necessary and must consider the following flood-causing mechanisms: [LIST MECHANISMS].

[If the staff does not confirm the licensee's conclusion, the situation will be handled on a case-by-case basis.]

Section 5 of JLD-ISG-2012-05 describes the flood hazard parameters needed to complete the Integrated Assessment. The staff reviewed the following subset of these flood hazard parameters to conclude that the flood hazard information is appropriate input to the Integrated Assessment:

- Flood event duration (see Figure 1 and Table 4), including warning time and intermediate water surface elevations that trigger actions by plant personnel, as defined in JLD-ISG-2012-05
- Flood height and associated effects, as defined in JLD-ISG-2012-05 (see Table 5)

The staff requested additional information from the licensee to supplement the FHRR as discussed in Section 3 of this staff assessment. Use the following statement only if necessary (i.e. if the licensee provided additional information that was not previously discussed but will be used as input to the integrated assessment). The following ADAMS accession numbers [LIST ML NUMBERS] provide additional information from the licensee to support the Integrated Assessment.

[Discuss hazard parameter data needed for the integrated assessment.]

[Only hazards considered in the integrated assessment will be listed in the Tables 4 and 5 below.]

Table 4: Flood Event Duration (see Figure 1) for Reevaluated Flood-Causing Mechanisms

[Fill out the table with information as reported by the licensee for all flood-causing mechanisms. Include figures as appropriate. A sample entry for failure of dams is shown to clarify contents of table.]

Flood-Causing Mechanism	Site Preparation for Flood Event [Time Unit: hrs or days]	Period of Site Inundation [Time Unit: hrs or days]	Recession of Water from Site [Time Unit: hrs or days]
DELETE ALL HAZARDS NOT IN THE INTEGRATED ASSESSMENT			
Local Intense Precipitation and Associated Drainage	Specify unit of time for each entry	Specify unit of time for each entry	Specify unit of time for each entry
Streams and Rivers			
Failure of Dams and Onsite Water Control/Storage Structures	[8 hrs]	[16 hrs]	[8 hrs]
Storm Surge			
Seiche			
Tsunami			
Ice-induced			
Channel Migrations or Diversions			

Table 5: Reevaluated Flood-Causing Mechanisms and Associated Effects Hazards

[Fill out the table with information as reported by the licensee for all flood-causing mechanisms. Include figures as appropriate. A sample entry for storm surge is shown to clarify contents of table.]

Reevaluated Flood-Causing Mechanism	Stillwater Elevation (ft DATUM)	Associated Effects (ft) [state the effect]	Reevaluated Flood Hazard (ft DATUM)	Reference
DELETE ALL HAZARDS NOT IN THE INTEGRATED ASSESSMENT				
Local Intense Precipitation and Associated Drainage	X.X	Y.Y	Sum of X.X+Y.Y=Z.Z	List the FHRR section or RAI response

Streams and Rivers				
Failure of Dams and Onsite Water Control/Storage Structures				
Storm Surge	[20.0, including tides]	[5.1 due to wave run-up]	[25.1]	
Seiche				
Tsunami				
Ice-Induced				
Channel Migrations or Diversions				

Based upon the preceding analysis, staff confirmed that the reevaluated flood hazard information defined in the sections above is appropriate input to the Integrated Assessment. As described in the 50.54(f) letter, the licensee should submit the Integrated Assessment no later than two years from the date of the FHRR. Thus, the licensee’s Integrated Assessment submittal is due to the NRC by [Month Day, Year].

5.0 CONCLUSION

The NRC staff has reviewed the information provided for the reevaluated flood-causing mechanisms of [Plant Name], Unit No[s]. Based on its review, the staff concludes that the licensee conducted the hazard reevaluation using present-day methodologies and regulatory guidance used by the NRC staff in connection with ESP and COL reviews.

[If the staff does not confirm that the licensee used present-day methodologies and regulatory guidance, the situation will be handled on a case-by-case basis.]

[NO INTEGRATED ASSESSMENT NECESSARY]

Based upon the preceding analysis, the NRC staff confirmed that the licensee responded appropriately to Enclosure 2, of the 50.54(f) letter, dated March 12, 2012. In reaching this determination, staff confirmed the licensee’s conclusions that (a) the reevaluated hazard results for each reevaluated flood-causing mechanism are bounded by the current design basis flood hazard, and (b) an Integrated Assessment is not necessary. The NRC staff has no additional information needs at this time with respect to Enclosure 2.

--- OR ---

[INTEGRATED ASSESSMENT IS NECESSARY]

Based upon the preceding analysis, the NRC staff confirmed that the licensee responded appropriately to Enclosure 2, Required Response 2, of the 50.54(f) letter, dated March 12, 2012. In reaching this determination, staff confirmed the licensee’s conclusions that (a) the reevaluated

flood hazard results for all reevaluated flood-causing mechanisms are not bounded by the current design basis flood hazard , (b) an Integrated Assessment including [LIST FLOOD-CAUSING MECHANISMS TO BE INCLUDED HERE] is expected to be submitted by the licensee, and (c) the reevaluated flood-causing mechanism information is appropriate input to the Integrated Assessment as described in JLD-ISG-2012-05. The NRC staff has no additional information needs at this time with respect to the FHRR.

Principal Contributor(s): [Names]

Date: [Month Day], 201X