PUBLIC SUBMISSION

SUNI Review Complete
Template=ADM-013
E-RIDS=ADM-03

ADD: Edward O'Donnell, Bridget Curran, Mary Neely
Comment (1)
Publication Date: 2/23/2022
Citation: 87 FR 10260

As of: 4/12/22 9:13 AM
Received: April 08, 2022
Status: Pending_Post
Tracking No. l1q-l0ss-v6mp
Comments Due: April 11, 2022
Submission Type: Web

Docket: NRC-2022-0037
Design-Basis Floods for Nuclear Power Plants

Comment On: NRC-2022-0037-0001
Design-Basis Floods for Nuclear Power Plants

Document: NRC-2022-0037-DRAFT-0002
Comment on FR Doc # 2022-03791

Submitter Information

Email: atb@nei.org
Organization: Nuclear Energy Institute

General Comment

See attached file(s)

Attachments

04-08-22_NRC_ Industry Comments on DG-1290 -R1

FRANCES PIMENTEL
Senior Project Manager
Risk and Technical Support

1201 F Street, NW, Suite 1100
Washington, DC 20004
P: 202.739.8132
fap@nei.org

NUCLEAR ENERGY INSTITUTE

April 8, 2022

Office of Administration
Mail Stop: TWFN-7-A60M
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTN: Program Management, Announcements and Editing Staff

Project Number: 689

Subject: NEI Comments on Draft Regulatory Guide DG-1290, "Design-Basis Floods for Nuclear Power Plants," Docket ID NRC-2022-0037

Submitted via regulations.gov

Dear Program Management, Announcements and Editing Staff,

The Nuclear Energy Institute (NEI)[1], on behalf of our members, appreciates the opportunity to provide comments on the subject Draft Regulatory Guide DG-1290, "Design Basis Floods for Nuclear Power Plants." The purpose of this letter is to provide the attached comments which recommend several changes to improve clarity and consistency on the recommended approaches, methods, and analysis this guidance provides.

The regulatory analysis associated with this revision concludes that this update should enhance nuclear power plant safety by providing up-to date guidance and information on determining the effects of severe flooding on nuclear power plants. While the proposed revision does provide reference to updated information, the guidance on design basis flood estimation approaches is very general and lacks specific application details that would enhance the effectiveness of the Regulatory Guide as a useful tool to both end users and the NRC. Additionally, the industry is concerned that the absence of details regarding the approaches and methods discussed in the revision inhibits the enhancement of regulatory certainty in this subject area.

[1] The Nuclear Energy Institute (NEI) is responsible for establishing unified policy on behalf of its members relating to matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect and engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations involved in the nuclear energy industry.

For example, the discussion in Appendix A on climate variability, climate change, and sea level rise. This section provides details with respect to sea level rise; however, little guidance is included identifying expectations as to which approaches may be preferred (or acceptable) and which hazards, other than storm surge, should be evaluated. To ensure more consistent treatment of climate change impacts, the appendix should include a discussion based on the current knowledge of which external flood hazards would be significantly impacted by climate change and how climate change extrapolations should be treated.

This is just one example of several provided in Attachment 1 that recommend providing additional detail on ways the NRC expects applicants and licensees to apply the updated information presented in this revision. We appreciate the NRC's effort in developing this draft guidance and encourage your consideration of all stakeholder comments prior to finalizing this draft Regulatory Guide. We trust that you will find these comments useful and informative as you finalize the draft. Please contact me at fap@nei.org or (202) 739-8132 with any questions or comments about the content of this letter or the attached comments.

Sincerely,

Frances Pimentel

Frances A. Pimentel

Attachment

c: Joseph Kanney, RES/DRA/FXHAB, NRC
Edward O'Donnell, RES/DE/RGPMB, NRC

Attachment 1
Comments on Draft Regulatory Guide DG-1290, "Design Basis Floods for Nuclear Power Plants"

	Section	Comment/Basis	Recommendation
1.	Overall message	There are some places that hint at a nuclear power plant design that is not challenged by a flood event not needing to perform the detailed analyses described in this DG. This DG would benefit from explicitly stating that a purely deterministic approach that assumes the entire facility is under water should not need to provide the NRC staff with the rigorous, site-specific analyses described in this DG.	This DG would benefit from explicitly stating that a purely deterministic approach that assumes a worst-case flood condition should not need to provide the NRC staff with the rigorous, site-specific analyses described in this DG.
2.	B. Analysis Approach (Page 7)	The document states that an acceptable framework for probabilistic assessments is not currently available nor are standards acceptable to NRC staff available to review such a probabilistic analysis. Accordingly, Probabilistic Flood Hazard Assessments (PFHA) will be considered only on a case-by-case basis by NRC staff.	This statement conflicts with NRC's planned endorsement of the ANS/ASME PRA standard that requires PFHA be used to deal with flooding. Since the standard requires it, NRC should be able to describe what is needed or NRC should not endorse that part of the standard calling for PFHA.
3.	B. Analysis Approach (Page 7)	The document notes: "This guide does not provide specific guidance on probabilistic methods for developing quantitative estimates of flooding hazards," however, the DG further states "The staff expects that either probabilistic or frequency-based estimates, or some combination of the two, will be needed to inform the analysis of combined events." Furthermore, the staff notes that a framework or Standard for review of these approaches does not exist. This is noted to be of particular importance in the low frequency tails (< 10-4/yr) of the distribution.	NRC should consider guidance on how probabilistic approaches could be used for combined events.
4.	B. Analysis Approach (Page 8)	NRC notes "Appendix A to this guide further discusses PFHA."	The discussion in App A provides no significant guidance as to what a PFHA should contain and expectations with regards to

	Section	Comment/Basis	Recommendation
			treatment of uncertainty. Please provide more details on how a probabilistic approach could be used for combined events.
5.	B. Flood-Causing Mechanisms. Flooding Caused by Local Intense Precipitation (Page 8 to 9) and C.3.a Flooding Caused by Local Intense Precipitation (Page 17) and C-1. General Considerations (Page C-1 to C-2)	While in agreement with how a vast majority of Flood Hazard Reevaluations (FHRs) were performed for Local Intense Precipitation (LIP), criteria for the functionality of a site's drainage network/stormwater management system should be provided. Mechanisms could include regular maintenance and inspection are performed as part of a storm preparedness operating procedures.	Update the document to detail whether there are any acceptable circumstances or conditions to which NRC staff would consider the site drainage or stormwater management system to be functioning or partially functioning during an LIP event.
6.	B. Flood-Causing Mechanisms. Wind-Generated Associated Wave Effects (Page 12)	The document notes that wind-generated wave activity may yield a significant hazard independent or coincident with severe hydrometeorological conditions, specifically that a distant storm could yield more severe wave action than a local storm event.	While agreed that a distant storm may be the bounding scenario, it would be helpful to place some bounds or framework, at least conceptually, on the types and locations of events that must be considered as part of the wave effects analysis for coastal locations.
7.	C.2.a	The current value used as the annual probability of exceedance for the reasonableness of combined event flooding scenarios (1E-6) is unreasonably low and does not have an associated justification.	This value is more conservative than even the seismic values in some ways, and there is less data available for flooding in many locations. Instead, NRC should focus on the potential for core damage (or equivalent for designs using other metrics). For example, a flood with given a mean annual frequency of E-5 per year with a CCDP of 0.1, with the CCDP crediting reliability of event mitigation, should be acceptable as this is consistent with other regulatory approaches to external hazards, e.g., seismic. Similar consideration of event mitigation can be included in identifying the mean

	Section	Comment/Basis	Recommendation
			annual frequency for designs that use metrics other than core damage.
8.	C.2.b	The Extreme Storm Data Compilations section does not recognize the value these data sources have or how they should be included in identifying flood potential. Further, site specific characterization of flood potential should not need to be included if a reactor design is not challenged by flooding.	Recognize that when a technically accurate, publicly available data source is up to date for a region, it can be employed to characterize flooding in the region. Further, recognize that some advanced NPPs may not be challenged by flooding.
9.	C.2.c. Nonstationary Effects (Page 16)	In discussion of sea level rise, it is stated "…Additional site-specific analyses will need to support less conservative estimates described in USGCRP Appendix A."	The document should further elaborate on when site-specific analysis may differ from design-basis flood analyses (which are requested to follow the USGCRP Appendix A methodology). The document should detail the basis for an acceptable less conservative sea level rise estimate.
10.	C.3.d Flooding Caused by Storm Surges, Seiches, and Tsunamis (Page 19-20)	The process detailed for hurricane parameter selection in areas where limited historical data is available mirrors very close a probabilistic-style evaluation, both in consideration of the interdependency of meteorological conditions and storm surge-related effects of the storms. However, there is no detailed guidance provided about how to approach the selection other than the use of "current state-of-the-art knowledge of storm phenomenology" which is ambiguous.	Provide a better definition and/or framework for storm parameter selection in areas with a deficient historical record that may not be representative of worst-case situation(s). Further elaborate on the data sampling noted for synthetic storm simulations. What suite of synthetic storms would NRC staff find acceptable for an PMH evaluation?
11.	C.3.h Combined Events (Page 22)	"The NRC staff currently uses an average annual probability of exceedance of less than 1 x 10-6 as a metric to evaluate the reasonableness of combined flooding event scenarios. However, guidance on formal PFHA approaches needed for consistent treatment of combined events is lacking. Therefore, the NRC will assess the reasonableness of qualitative and	A more complete discussion of acceptability of frequency methods should be considered in the final version of the DG. Given the significance of the metric it would seem appropriate for NRC to provide guidance to help the analyst develop an acceptable approach and

	Section	Comment/Basis	Recommendation
		quantitative probability estimates for combined events on a case-by-case basis."	presentation and, in particular, identify pitfalls.
12.	A-3. Non-stationarity: Climate Variability, Climate Change, and Sea Level Rise (Page A-2 to A-3)	In terms of coastal erosion effects, the document cites a study for SLR effects on coastal erosion, both for cliff- and dune-backed coastlines. However, many east coast power plant sites do not fit into classical "dune-backed" coastlines as there are hardened, engineered structures between the open coast and powerblock, and sometimes no traditional dune present at the site. In these situations, what is the staff's recommendations regarding SLR and erosional effects? Or even how to estimate erosional effects in general?	Please include recommendations or a methodology for erosional effects (with and without SLR) for sites that may not be able to directly use published methods for classical cliff- or dune-backed coastlines.
13.	A-3. Non-stationarity: Climate Variability, Climate Change, and Sea Level Rise (Page A-2 to A-3)	The report discusses climate change and provides some details with respect to SLR. However, there is a general discussion where it is noted that "current difficulty" … [exists] …"in translating climate research findings into practical applications for hydrologic design problems. In spite of the difficulties, decisions need to be made, and several State and Federal agencies have developed frameworks for assessing climate change risks for water resource applications." While a number of references are identified for specific locations, little guidance is provided in that section identifying expectations as to which approaches may be preferred (or acceptable) and which hazards other than storm surge should be evaluated.	If the NRC staff is expecting consistent treatment of climate change impacts, the NRC staff should provide a discussion based on current knowledge, on which of the external flood hazards would be significantly impacted by climate change and how climate change extrapolations should be treated.
14.	E-3. Source of Historical Storm	The document suggests use of synthetic storms to account for "conditions more severe than those in the historical record but considered to be physically	Elaborate on the use of synthetic storm sets and how those sets should be developed to properly address the

	Section	Comment/Basis	Recommendation
	Information (Page E-3)	reasonable." Could the staff provide guidance on when and how synthetic storms should be developed? Presumably, synthetic storm sets are most applicable where the historical record of extreme tropical cyclone events are relatively lacking, such as the northeast U.S. coast, but confirmation of where this technique should be applied and what type of meteorological analysis would be deemed acceptable as "physically reasonable" storm parameters would help guide future evaluations.	staff's concern about lack of historical storm records.
15.	E-4.2 Coupled Wind, Wave, and Hydrodynamic Modeling (Page E-4 to E-5)	Acceptable hydraulic modeling software, notably Delft3D, should be included by reference for determine the storm surge and wave parameters for a PMH event.	Include Delft3D (and other acceptable, state-of-the-art software options) by reference.
16.	F-1. Discussion (Pages F-1 to F-2)	The seiche methodology acknowledges that if the natural oscillation mode(s) of a water body are not dissimilar from "credible forcing" presumably from meteorological events, such as multiple squall lines/derechos occurring on the water body at that natural resonance frequency, would there be other expected meteorological or non-meteorological forcing to be included in the analysis? Presumably, the geometry/direction of expected squall lines would be included in the "credible forcing" evaluation. For example, squall lines may only occur in an east-west direction, so they would not need to be considered in a north-south direction.	Address the "credible forcing" questions and update Section F.1 as needed based on those responses.
17.	G-3. Tsunami Computational Modeling Tools (Page G-3 to G-4)	Multiple modeling software options are noted, but other commercial hydraulic software, namely Delft3D is comparable to ADCIRC in solving shallow-water wave propagation and should be included by reference as an appropriate technique.	Include Delft3D by reference as an acceptable shallow-water wave propagation solver for tsunami applications.

	Section	Comment/Basis	Recommendation
18.	J-1. Coincident Wave Height and J-2. Wave Runup (Page J-1 to J-2)	Outside of a screening-type application for the hazard, significant wave height, maximum wave height, and wave runup are relatively inconsequential parameters. It would be rare that the largest storm waves break at/onto powerblock structures directly as larger waves would break over shallow embankments/other site features. Hydrodynamic/hydrostatic forces from the breaking/broken waves and overtopping volumetric rates around the power block area are of critical concern, but a further explanation of an acceptable framework outside of the brief mention of ACES/CEDAS and the USACE CEM. These effects are the critical component to assess the adequacy of protection measures, so more details about what the staff would deem an acceptable method would be welcomed.	Include further methods for assessing wave overtopping and wave forces which are more critical to plant safety than wave height or wave runup height alone.
19.	J-5. Water borne debris	The discussion in this section seems relatively brief. Expand the discussion to more clearly indicate the expectations for treating this phenomenon.	Expand discussion and perhaps include an example application and provide relevant references of reasonable examples of an assessment of the impact of water borne debris.
20.	J-6. Effects of Sediment Erosion or Deposition (Page J-3)	The USACE CEM is referenced for consideration of erosional/depositional effects for structures (e.g., embankment walls, roads). Outside of standard scour methodology, does the staff expect any other analysis to assess the adequacy of plant design and protection measures with respect to erosional/depositional effects?	Elaborate on erosional/depositional effects analyses expected by the staff.
21.	J-6. Effects of Sediment Erosion or Deposition (Page J-3)	Appendix G (Flooding Caused by Tsunami) references Appendix J for related effects analyses. Is the USACE CEM an adequate framework for assessing sedimentation/depositional effects from tsunami events? Tsunami waves are long period and behave	Comment on the applicability of the USACE CEM scour and erosional/depositional effect methods are for tsunami waves.

	Section	Comment/Basis	Recommendation
		differently than swell/storm wind waves to which the scour and other similar equations presented in the USACE CEM have been calibrated. Have those equations been calibrated for tsunami-like events?	
22.	J-6. Effects of Sediment Erosion or Deposition (Page J-3)	The guidance is unclear in how this evaluation is expected to be performed, and in particular its role in a hazard assessment as opposed to fragility assessment. In evaluating the scenario impacts of erosion for assessments of SSCs, is the concern about the short-term impact of this mechanism on SSCs (single storm/weather/flood impacts) or the combined impact of the erosion / deposition challenge over a number of months/years due to repeated events. Earlier versions of this RG didn't address this issue.	Expand upon what specific issues are expected to be addressed within the deposition/erosion challenge within the assessment of SSC fragility. Consider including an example in the RG as to what might be reasonable to include in the treatment of these phenomena.
23.	Appendix K-1	There is paragraph in this section that states it recognizes some advanced reactor designs may use materials that have potential for adverse reactions. It specifically calls out sodium fast reactors for their use of sodium as a coolant. However, every design will have unique elements that may or may not contribute to flooding susceptibility.	Every design will have unique elements that may increase or decrease susceptibility to flooding, be it composition of coolant, reliance on electrical power, etc. It is unclear why sodium is explicitly stated here, rather than a broad recognition that designs should consider susceptibilities to flooding holistically.
24.	Appendix K-2, Figure K-1	The flow chart starts with Describe Site Characteristics. Some advanced nuclear power plant designs can demonstrate that there will be no radiological release no matter the size of the flood. Thus, no site flood characteristics are necessary to demonstrate safety.	Recommend initially identifying if flooding is a safety challenge to the plant design.