

Regulatory Guide Periodic Review

Regulatory Guide Number: 1.122, Revision 1

Title: Development of Floor Response Spectra for Seismic Design of Floor Supported Equipment or Component

Office/division/branch: RES/DE/SGSEB
Technical Lead: Jinsuo Nie

Staff Action Decided: Reviewed with issues identified for future consideration

1. What are the known technical or regulatory issues with the current version of the Regulatory Guide (RG)?

The RG is written at a very high level and the acceptance criteria are based on techniques in use prior to 1978. The RG could be updated to incorporate more current methods to account for aleatory and epistemic uncertainties in modeling and analysis of the supporting structures and soil media. The current practice explicitly accounts for certain uncertainties through probabilistic approaches, which warrants a corresponding consideration of those uncertainties in this RG. A number of technical areas in this RG also overlap other RGs or staff guidance that have been updated more recently. An update to the RG could take advantage of enhanced practices, industry standards, and NRC staff guidance, including those listed below.

- American Society of Civil Engineers (ASCE) 4-16, "Seismic Analysis of Safety-Related Nuclear Structures and Commentary," (2017);
- ASCE 43-05, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities," (2005);
- RG 1.92, "Combining modal responses and spatial components in seismic response analysis," (2012), ADAMS Accession Number ML12220A043.
- RG 1.208, "A performance-based approach to define the site-specific earthquake ground motion" (2007), ADAMS Accession Number ML070310619.
- Interim Staff Guidance DC/COL-ISG-17, "Ensuring Hazard-Consistent Seismic Input for Site Response and Soil Structure Interaction Analyses," (2009), ADAMS Accession Number ML100570203.
- NUREG-0800, Section 3.7.1, "Seismic Design Parameters," (2014), ADAMS Accession Number ML14198A460.

2. What is the impact on internal and external stakeholders of not updating the RG for the known issues, in terms of anticipated numbers of licensing and inspection activities over the next several years?

Determination of floor response spectra based on improved methods is needed for both large light water reactors and small modular reactors. In terms of licensing reviews there are no large power reactor standard design applications or combined license applications anticipated to be received in the near future (next 1 to 3 years).

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One small modular reactor standard design application is currently being reviewed and finalized on a design-specific basis. In addition, the NRC received a topical report for AP1000 Specialized Seismic Option (staff's review is temporally on hold at request of Westinghouse). Hence, there is no immediate impact of not updating this RG. However, an updated version of this RG could be beneficial for new reactor design submittals in the future.

3. What is an estimate of the level of effort needed to address identified issues in terms of full-time equivalent (FTE) and contractor resources?

Revision of the RG will take ~0.5 FTE of staff effort and some contract support to update RG 1.122 with respect to incorporating the practices and techniques in seismic analysis of nuclear structures that have greatly evolved over the last 40 years.

4. Based on the answers to the questions above, what is the staff action for this guide (Reviewed with no issues identified, Reviewed with issues identified for future consideration, Revise, or Withdraw)?

Reviewed with issues identified for future consideration

5. Provide a conceptual plan and timeframe to address the issues identified during the review.

The NRC staff plans to conduct a review of the more recent developments in determination of floor response spectra available since issuance of the current version of RG 1.92 in 1978. This will involve reviewing licensing documents (safety evaluation reports and requests for additional information), relevant sections of the ASCE 4 and ASCE 43 standards, and staff guidance documents, to document the current state of knowledge. This activity would start in FY2020 or FY2021 depending on funding limitations and staff priorities, and would be completed in approximately 1 year. The results would inform a decision whether to revise RG 1.122 in the future.

NOTE: This review was conducted in April 2019 and reflects the staff's plans as of that date. These plans are tentative and subject to change.