

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 Components**

Office/division/branch: **RES/DE/SGSEB**
Technical Lead: **Scott Stovall**

Staff Action Decided: **Revise**

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

The RG dates to 1978 and is written at a very high level. The methodology is based on techniques in use at that time. There are no details on acceptable methods for the incorporation of uncertainties in material properties of the structure and soil, damping values, and soil-structure interaction models in the current version of the RG. Since its issuance there has been significant progress with probabilistic methods and this information should be incorporated into future revisions of the guide. The staff recognizes that the development of fully probabilistic floor spectra is not practical in the very-short term. However, hazard-informed floor spectra are needed for use in seismic probabilistic risk analyses (SPRA). In its current form the RG provides no guidance on how to develop consistent hazard-informed floor spectra. Material to be considered in updating the guide includes:

- American Society of Civil Engineers (ASCE) 4-98, "Seismic Analysis of Safety-Related Nuclear Structures and Commentary," (1998);
- ASCE 43-05, "Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities," (2005);
- ASME/ANS RA-S, Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications;
- Electric Power & Research Institute (EPRI) "Seismic Evaluation Guidance," EPRI Report 1025287, (2010), ADAMS accession number ML12333A170;
- Interim Staff Guidance DC/COL ISG-020, "Interim Staff Guidance on Implementation of a Probabilistic Risk Assessment-Based Seismic Margin Analysis for New Reactors," (2010), ADAMS Accession Number ML100491233;

- RG 1.200, “An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities”; and
- RG 1.208, “A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion”.

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?

Determination of floor response spectra based on improved methods is needed for both large light water reactors (LWR) and small modular reactors (SMR). In terms of licensing reviews there are no large power reactor combined license applications anticipated in the near future (next 3 to 5 years). One small modular reactors application is anticipated in the next two years. In addition, NRC received a Design Certification application from Korea Hydro and Nuclear Power (KHNP) for the design for their APR 1400, a large LWR and seismic response spectra will play an important role in the design certification review. The NRC anticipates receiving a topical report for an enhanced seismic certification of the AP1000 in a year or so. An updated version of this RG will be beneficial for new reactor design submittals, the performance of SPRAs for the four new reactors under construction prior to fuel load, and for approximately 40 operating reactor units (NTTF 2.1 Seismic) that will be conducting SPRAs in response to Fukushima requirements.

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

Revision of the RG will take ~0.5 FTE of staff and contract support to update RG 1.122 with respect to developments in seismology, site response and soil-structure interaction over the last 35 years.

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

Revise

5. If a RG should be revised, provide a conceptual plan and timeframe to accomplish this.

1. Develop work plan for the portions of RG 1.122 requiring attention.
2. Develop strategy for risk-informing design process for floor spectra.
3. Harmonize the RG with existing standards and codes. Estimated completion of steps 1, 2 & 3 by Qtr. 4, FY 2015.
4. For technical problems that remain unaddressed, develop technical basis to address them. Estimated completion Qtr. 1, FY 2017.

5. Deliver draft RG to the Regulatory Guidance and Generic Issues Branch/RES and obtain interoffice concurrence by Qtr. 2, FY 2017.
6. Publish draft RG for public comment. Estimated Qtr. 4, FY 2017.

NOTE: This review was conducted in February 2015 and reflects the staff's plans as of that date. These plans are tentative and subject to change.