

Regulatory Guide Periodic Review

Regulatory Guide Number: 1.166, Revision 0

Title: Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions

Office/Division/Branch: RES/DE/SGSEB
Technical Lead: Vladimir Graizer

Staff Action Decided: Revise

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

RG 1.166 provides guidance for evaluation of recorded instrumentation data after an earthquake and for determining whether plant shutdown is required by title 10 of the Code of Federal Regulations (10 CFR) Part 50. It is a companion to RG 1.167, "Restart of a Nuclear Power Plant Following a Seismic Event." The latter provides guidance on restarting a nuclear power plant following shutdown by an earthquake due to observed damage or exceeding the operating basis earthquake (OBE).

Both guides endorse with exceptions Electric Power and Research Institute (EPRI) NP-6695 "Guidelines for Nuclear Power Plant Response to an Earthquake" (1989). In the years following the issuance of EPRI-6695, a significant amount of experience has been gained on the effects of earthquakes on nuclear power plants worldwide and the actions needed for their restart. The International Atomic Energy Agency (IAEA) documented lessons learned from all significant earthquakes affecting nuclear power plants pre-2010 in Safety Reports Series No. 66, "Earthquake Preparedness and Response for Nuclear Power Plants" (2011). The report draws upon insights from three multiunit nuclear power plants in Japan and one in Armenia that experienced beyond-design-basis earthquakes. In addition to those plants, experience has been gained with the 2011 shutdown of the North Anna nuclear power plant following the Mineral, Virginia earthquake due to ground motion exceeding the safe shutdown earthquake. Based on the lessons learned in establishing the effects of the earthquakes on the plants and the actions undertaken to restart them, a significant update of the EPRI-6695 was prepared and published in 2013 as EPRI report 3002000720, "Guidelines for Nuclear Plant Response to an Earthquake."

The American Nuclear Society/American National Standards Institute (ANS/ANSI) standard ANS/ANSI-2.23-2016, "Nuclear Power Plant Response to an Earthquake," incorporates the significant changes and additions included in EPRI report 3002000720. ANS/ANSI-2.23-2016 builds on EPRI NP-6695 by adding guidance on action levels that clarify what should be done, when it should be done, and by whom. It provides more comprehensive guidance than EPRI NP-6695 for short term actions to be performed by a licensee following an earthquake, and for long term post-earthquake evaluations. To take advantage of the more comprehensive guidance, the guides should be combined and updated to endorse ANS/ANSI-2.23-2016 rather than the earlier guidance of EPRI NP-6695.

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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?**

There are no new large power reactor license applications anticipated in the near future (next 3 to 5 years). Thus, there is no immediate need for revising the guide to address their licensing. For small modular reactors, the review of the NuScale design certification is under review and it is premature to develop unique guidance to address that design.

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

Revision of the RG will take approximately 0.2 FTE of NRC staff time.

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)?**

Revise.

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

The staff plans to update and combine this guide with RG 1.167 by end of the fourth quarter of FY 2018, and issue it for public comment in the second quarter of FY 2019.

NOTE: This review was conducted in May 2018 and reflects the staff's plans as of that date. These plans are tentative and subject to change.