1. IDENTIFICATION

Document Category or set of publications to be revised in a concomitant manner

Specific Safety Guide

Working ID: DS522

Proposed Title: Evaluation of Seismic Safety for Existing Nuclear Installations


Review Committee(s) or Group: NUSSC, WASSC

Technical Officer(s): Ovidiu Coman, Neda Stoeva (EES/NSNI)

2. BACKGROUND

In the last three decades, seismic evaluation programmes have been conducted for a number of existing nuclear installations worldwide. The guidance provided by existing IAEA publications, such as Safety Standards Series No. NS-G-2.13 and Safety Reports Series No. 28, has been extensively used in the seismic re-evaluations of existing nuclear power plants mostly in eastern and central Europe. More recently, after the Fukushima Daiichi accident (March 2011), seismic safety evaluations for existing NPPs were revisited worldwide using updated methodologies based on accumulated experience.

NS-G-2.13 was published in 2009 and the applicable Safety Requirements at that time were: NS-R-1 “Safety of Nuclear Power Plants: Design” (2000), NS-R-2 “Safety of Nuclear Power Plants: Operation” (2000), NS-R-3 “Site Evaluation for Nuclear Installations” (2003), NS-R-4 “Safety of Research Reactors” (2005), NS-R-5 “Safety of Nuclear Fuel Cycle Facilities” (2008), and GS-R-3 “The Management System for Facilities and Activities” (2006). All of the abovementioned publications have meanwhile been revised and updated. This revision of NS-G-2.13 will provide guidance on using updated seismic safety evaluation methodologies which have been validated by the current international state of practice.

This revision will supersede and replace the IAEA Safety Guide NS-G-2.13, “Evaluation of Seismic Safety for Existing Nuclear Installations”.

3. JUSTIFICATION FOR THE PRODUCTION OF THE DOCUMENT

The revised Safety Guide will provide guidance to re-evaluate seismic safety for existing nuclear installations, supporting applicable requirements from GSR Part 4 (Rev. 1), SSR-2/1 (Rev. 1), SSR-2/2 (Rev. 1), SSR-3 and SSR-4.

The current Safety Guide NS-G-2.13 issued in 2009 needs an update addressing the following issues:

- Changes in the requirement documents in higher hierarchy (GSR Part 4 (Rev. 1), SSR-1, SSR-2/1 (Rev. 1), SSR-2/2 (Rev. 1), SSR-3 and SSR-4);
• Considerations fulfilling the gap between the existing publication and the current state of practice in IAEA Member States;

• Evolution of the techniques and methodology in seismic safety assessment of nuclear installations.

The changes mentioned above include the issues highlighted in the Director General’s Report on the Fukushima Daiichi Accident (2015). For instance, the new Safety Guide needs to address provisions on seismic hazard severity higher than the one used in design, methodologies that consider explicitly the uncertainties, provisions for a site with multiple nuclear facilities, etc.

Furthermore, the terminology needs to be revised and made consistent with the new definitions in the safety requirements and the IAEA Safety Glossary (2018 Edition).

The revision will also take into consideration feedback from existing operating experience, technical safety review services, advisory services and the current state of practice.

4. OBJECTIVE

The main objective of the revised Safety Guide is to provide recommendations and guidance on how to meet the applicable requirements from GSR Part 4 (Rev. 1), SSR-1, SSR-2/1 (Rev. 1), SSR-2/2 (Rev. 1), SSR-3 and SSR-4, related to seismic safety assessment for existing nuclear installations. The second objective is to align the guidance to the current international state of practice in IAEA Member States.

5. SCOPE

The scope addresses an extended range of existing nuclear installations, as defined in the IAEA Safety Glossary. The seismic safety evaluation methodologies developed for nuclear power plants are also applicable to other nuclear installations through a graded approach. Two methodologies are discussed in detail: the deterministic approach generally represented by seismic margin assessment (SMA) and the seismic probabilistic safety assessment (SPSA). Variations of these approaches or alternative approaches should be demonstrated to be acceptable.

6. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS

The proposed Safety Guide falls within the thematic area of safety evaluation and will interface with the following IAEA Safety Standards and other publications (this is not, and cannot be, regarded as an exclusive or exhaustive list):

• SSR-2/1 (Rev. 1), Safety of Nuclear Power Plants: Design (2016)
• SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Operation (2016)
• SSR-3, Safety of Research Reactors (2016)
• SSR-4, Safety of Nuclear Fuel Cycle Facilities (2017)

1 DS522 Evaluation of Seismic Safety for Existing Nuclear Installations is not addressing off-site implications and has no interface with documents related to Emergency Preparedness and Response.
7. OVERVIEW

The proposed Safety Guide will have a structure consisting of general recommendations for planning and conducting seismic safety evaluation for existing nuclear installations.

As for general aspects, the proposed Safety Guide will address or consider the following:

- The existing recommendations of NS-G-2.13 will be revised to ensure consistency with the applicable Safety Requirements publications (GSR Part 4 (Rev. 1), SSR-1, SSR-2/1 (Rev. 1), SSR-2/2 (Rev. 1), SSR-3 and SSR-4);
- The application of the management system will be revised to ensure consistency with GSR Part 2.

As for technical aspects, the proposed Safety Guide will address or consider the following:

- The recent updates in seismic hazard assessment in site evaluation for nuclear installations (DS507);
- Applicable provisions of the Safety Guide on Periodic Safety Review for Nuclear Power Plants (SSG-25);
- Updated methodologies for seismic margin assessment and seismic PSA;
- A performance based graded approach for moderate and low hazard nuclear installations will update the chapter on “Nuclear installations other than Power Plants”.

The contents of the proposed Safety Guide will be similar to the existing Safety Guide NS-G-2.13, with some amendments. The planned table of contents is as follows:

1. Introduction
2. General recommendations
3. Selection of the Seismic Safety Assessment Methodology
4. Data Collection and Investigations
5. Seismic Safety Assessment
8. PRODUCTION SCHEDULE:

Provisional schedule for preparation of the document, outlining realistic expected dates for each step

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* Column A for Safety Fundamentals, Safety Requirements and Safety Guides.
* Column B for Nuclear Security Series publications
* Column C for TECDOCs, safety reports and other publications

9. RESOURCES

20 staff-weeks of professional staff plus 80 thousand Euros for a Technical Meeting and consultancy meetings.