

Document Preparation Profile (DPP) Version 0.6, 12 Mar. 2019

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

Proposed Action: Revision of Safety Guide NS-G-2.13, Evaluation of Seismic Safety for Existing Nuclear Installations (2009)

Review Committee(s) or Group: NUSSC, WASSC

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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 (2016 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 ~~(including operating experience related to seismic re-evaluations of NPPs, e.g. Kashiwazaki Kariwa, Fukushima Daiichi, Onagawa).~~

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 process to evaluate seismic safety for existing nuclear installations consists of the following steps: a) define the purpose of the seismic safety evaluation, b) define the Review Level Earthquake (which is different from the Design Base Earthquake), based on site specific seismic hazards results, c) select the suitable methodology, d) define the implementation programme and expected outputs, e) peer review, f) document the results in a manner that facilitates decisions concerning safety.~~ 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)
- GSR Part 2, Leadership and Management for Safety (2016)
- ~~DS484~~/SSR-1, Site Evaluation for Nuclear Installations (~~revision of NS R-3 (Rev.1)~~)
- GSR Part 4 (Rev. 1), Safety Assessment for Facilities and Activities (2016)
- DS507, Seismic Hazards in Site Evaluation for Nuclear Installations (revision of SSG-9)
- DS490, Seismic Design of Nuclear Installations (revision of NS-G-1.6)
- SSG-3, Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants (2010)
- SSG-25, Periodic Safety Review for Nuclear Power Plants (2013)
- Safety Reports Series No. 28, Seismic Evaluation of Existing Nuclear Power Plants (revision is in process of publication, PC8381)
- Safety Reports Series No. 94, Approaches to Safety Evaluation of New and Existing Research Reactor Facilities in Relation to External Events (revision is in process of publication, PC6172).

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 Evaluation Methodology
 4. Definition of the Review Level Earthquake
 5. Data Collection and Investigations
 6. Seismic Margin Assessment
 7. Seismic Probabilistic Safety Assessment
 8. Moderate and Low Hazard Installations
 9. Considerations for Upgrading
 10. Peer Review
 11. Documentation
 12. Application of the Management System
- References
- Appendices

8. PRODUCTION SCHEDULE:

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

	A*	B*	C*
STEP 1: Preparing a DPP	March 2019		
STEP 2: Approval of DPP by the Coordination Committee	April 2019		
STEP 3: Approval of DPP by the relevant review Committees	June 2019		
STEP 4: Approval of DPP by the CSS	December 2019		
STEP 5: Preparing the draft Indicate as to whether a TM is expected to be organized for the preparation of the draft	TM June 2020 Complete Final Draft 3Q 2020		
STEP 6: Approval of draft by the Coordination Committee	4Q 2020		
STEP 7: Approval by the relevant review Committees for submission to Member States for comments	2Q 2021		
STEP 8: Soliciting comments by Member States	3Q 2021		
STEP 9: Addressing comments by Member States	4Q 2021		
STEP 10: Approval of the revised draft by the Coordination Committee Review in NSOC-SGDS (Technical Editorial review)	1Q 2022		
STEP 11: Approval by the relevant review Committees	2Q 2022		
STEP 12: - Submission to the CSS - Submission in parallel and approval by the Publications Committee - MTCED Editing - Endorsement of the edited version by the CSS	4Q 2022		
STEP 13: Establishment by the Publications Committee and/or Board of Governors (for SF and SR only)	N/A		
STEP 14: Target publication date	2Q 2023		

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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.