

**SPESS F**  
**Document Preparation Profile (DPP)**  
**Version 03 dated 17 February 2022**

## 1. IDENTIFICATION

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

**Safety Guides**

**Working ID:** DS535

**Proposed Title:** Periodic safety review for nuclear power plants

**Proposed Action:** Revision of SSG-25

**Review Committee(s) or Group:** NUSSC (lead), RASSC, WASSC, EPreSC, NSGC

**Technical Officer(s):** Martin GAJDOS, Alexander DUCHAC (NSNI/SAS)

## 2. BACKGROUND

Operational nuclear power plants are generally subject to routine reviews of plant operational safety, or special safety reviews following operational events, to drive continuous safety improvements throughout their operational lifetime. However, these routine safety reviews are focused reviews and typically do not inclusively consider changes in safety standards and technological developments, the cumulative effects of plant ageing, plant modifications, feedback of operating experience, organizational and management issues, site related aspects or developments in science and technology.

To capture the aggregate effect of these topics on plant safety, Requirement 12 of IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Commissioning and Operation calls for the periodic conduct of a comprehensive, integrated safety review, commonly referred to as a 'periodic safety review' (PSR), which relies on a systematic and comprehensive process whereby up-to-date standards and technological developments are considered to provide assurance of the continued viability of the plant's licensing basis, given the cumulative aspects of emerging national and international standards, evolving regulatory requirements, plant ageing, operating experience, and technological development. PSR thus provides an effective way to obtain an overall view of actual plant safety and the quality of the safety documentation, and to determine reasonably practicable modifications for compliance with applicable standards with the aim of enhancing the safety of the plant by further reducing the likelihood and the potential consequences of accidents. Specifically, the assessment for the next operational period documents the following:

- The extent to which the plant conforms to current standards and practices;
- The extent to which the (updated) licensing basis will remain valid to next operational period, or to the end of the plant's proposed extended operating life;
- The adequacy of the arrangements that are in place to maintain plant safety for the next operational period;
- The reasonably practicable safety improvements to be implemented to resolve the safety issues that have been identified.

It is recognized that (in some jurisdictions) the PSR is consistently used to support decision making on periodic permission for continued operation. However, the PSR can provide evaluation of safety factors related to operation

beyond the original planned or licensed lifetime, usually referred to as ‘long term operation’ (LTO). These safety factors include (among others) plant design safety, actual condition of structures, systems and components (SSCs) important to safety, ageing and equipment qualification.

### **3. JUSTIFICATION FOR THE PRODUCTION OF THE PUBLICATION**

The existing Safety Guide SSG-25 provides recommendations and guidance on the conduct of a PSR for a nuclear power plant. Since it has been published in 2013, a significant enhancement of several IAEA safety standards has been made. As a result, SSG-25 does not reflect updated requirements relevant to periodic safety review of nuclear power plants that are established in the following publications:

- SSR 2/1 (Rev.1): Safety of Nuclear Power Plants: Design;
- SSR 2/2 (Rev.1): Safety of Nuclear Power Plants: Commissioning and Operation;
- GSR Part 2: Leadership and Management for Safety;
- GSR Part 3: Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards
- GSR Part 4 (Rev.1): Safety Assessment for Facilities and Activities;
- GSR Part 7: Preparedness and Response for a Nuclear or Radiological Emergency.

Several other IAEA safety standards recently published also have some relevance to periodic safety reviews. These include the following:

- SSG-2 (Rev.1): Deterministic Safety Analysis (a revision published in 2019);
- SSG-48: Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants (a revision published in 2018);
- SSG-51: Human Factors Engineering in the Design of Nuclear Power Plants (new Safety Guide published in 2019);
- SSG-61: Format and Content of the Safety Analysis Report for Nuclear Power Plants (a revision published in 2021);
- SSG-64: Protection against Internal Hazards in the Design of Nuclear Power Plants (published in 2021);
- SSG-67: Seismic Design for Nuclear Installations (a revision published in 2021);
- SSG-68: External Events Excluding Earthquakes in the Design of Nuclear Power Plants (a revision published in 2021);
- SSG-69: Equipment Qualification for Nuclear Installations (new Safety Guide published in 2021).

The recommendations provided in SSG-25 on the conduct of a PSR need to be updated to reflect the feedback received from Member States during Technical Meetings organized in the topical area of PSR for NPPs, TSR-PSR peer-review services conducted as well as changes made to IAEA safety standards.

### **4. OBJECTIVE**

The purpose of this Safety Guide is to provide recommendations and guidance on the conduct of a PSR for an existing nuclear power plant to determine whether they conform with current requirements and respective recommendations provided in existing IAEA safety standards. This Safety Guide is intended for use by operating organizations, regulatory bodies and their technical support organizations, consultants and advisory bodies. This updated Safety Guide will support the implementation of the IAEA Technical Safety Review (TSR) service on periodic safety review.

## 5. SCOPE

This publication will apply to operating nuclear power plants. It will revise the specific topics addressed in SSG-25 to reflect changes made to IAEA safety standards since the publication of SSG-25 in 2013. The anticipated revisions concern namely Section 3 (Input from the periodic safety review in assessing long term operation or licence renewal), Section 5 (Safety factors in a PSR) and Section 6 (Global assessment).

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

This publication will interface with at least the following IAEA Safety Standards Series publications:

- GSR Part 2: Leadership and Management for Safety
- GSR Part 3: Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards
- GSR Part 4 (Rev. 1): Safety Assessment for Facilities and Activities
- GSR Part 5: Predisposal Management of Radioactive Waste
- GSR Part 7: Preparedness and Response for a Nuclear or Radiological Emergency
- SSR-1: Site Evaluation for Nuclear Installations
- SSR-2/1 (Rev.1): Safety of Nuclear Power Plants: Design
- SSR-2/2 (Rev. 1): Safety of Nuclear Power Plants: Commissioning and Operation
- GSG-3: The Safety Case and Safety Assessment for the Predisposal Management of Radioactive Waste
- NS-G-2.13: Evaluation of Seismic Safety for Existing Nuclear Installations
- SSG-2 (Rev.1): Deterministic Safety Analysis
- SSG-3: Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants
- SSG-4: Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants
- SSG-9: Seismic Hazards in Site Evaluations for Nuclear Installations
- SSG-18: Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations
- SSG-21: Volcanic Hazards in Site Evaluation for Nuclear Installations
- SSG-30: Safety Classification of Structures, Systems and Components in Nuclear Power Plants
- SSG-34: Design of Electrical Power Systems for Nuclear Power Plants
- SSG-39: Design of Instrumentation and Control Systems for Nuclear Power Plants
- SSG-48: Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants
- SSG-51: Human Factors Engineering in the Design of Nuclear Power Plants
- SSG-52: Design of the Reactor Core for Nuclear Power Plants
- SSG-53: Design of the Reactor Containment and Associated Systems for Nuclear Power Plants
- SSG-54: Accident Management Programmes for Nuclear Power Plants
- SSG-56: Design of Reactor Coolant System and Associated Systems for Nuclear Power Plants
- SSG-61: Format and Content of the Safety Analysis Report for Nuclear Power Plants

- SSG-64: Protection against Internal Hazards in the Design of Nuclear Power Plants
- SSG-67: Seismic Design for Nuclear Installations
- SSG-68: External Events Excluding Earthquakes in the Design of Nuclear Power Plants
- SSG-69: Equipment Qualification for Nuclear Installations
- DS497A: Operational Limits and Conditions
- DS497B: Modifications of Nuclear Power Plants
- DS497C: The Operating Organization of Nuclear Power Plants
- DS497D: Core Management and Fuel Handling for Nuclear Power Plants
- DS497E: Maintenance, Surveillance and in-service Inspection for Nuclear Power Plants
- DS497F: Recruitment, Qualification and Training of Personnel for Nuclear Power Plants
- DS497G: Conduct of Operation at Nuclear Power Plants
- DS503: Protection against Internal and External Hazards in the Operation of Nuclear Power Plants

## **7. OVERVIEW**

The proposed publication will include the following contents:

1. INTRODUCTION
  - Background
  - Objective
  - Scope
  - Structure
2. RATIONALE, OBJECTIVE AND GENERAL RECOMMENDATIONS FOR PERIODIC SAFETY REVIEW
3. ROLES AND RESPONSIBILITIES DURING PERIODIC SAFETY REVIEW
4. THE REVIEW PROCESS OF PERIODIC SAFETY REVIEW
5. ACTIVITIES FOLLOWING PERIODIC SAFETY REVIEW
6. SCOPE, REVIEW STRATEGY AND GENERAL METHODOLOGY FOR PERIODIC SAFETY REVIEW
7. SAFETY FACTORS IN A PERIODIC SAFETY REVIEW
8. GLOBAL ASSESSMENT IN THE PERIODIC SAFETY REVIEW
  - Methodology for global assessment
  - Principles for ranking results from periodic safety review, including categorization of deviations identified
  - Development and justification of safety improvements for the next PSR period
9. INPUT FROM THE PERIODIC SAFETY REVIEW IN ASSESSING LONG TERM OPERATION
  - Plant programmes to support the safety factors relating to plant design, the actual condition of SSCs important to safety, equipment qualification and ageing
  - A management system that addresses quality management and configuration management for continued LTO
  - Safety analyses involving time limiting assumptions relating to the proposed lifetime
  - Programmes for promoting safety culture focused on the pursuit of excellence in all aspects of safety management and human factors for continued LTO

Development and justification of safety improvements for long term operation

Specific aspects of periodic safety review in support of assessment of long term operation

Appendix I INTERFACES BETWEEN SAFETY FACTORS

Appendix II DOCUMENTATION OF THE PSR

REFERENCES

Annex TYPICAL INPUTS, OUTPUTS AND RELEVANT PUBLICATIONS FOR THE REVIEW OF SAFETY FACTORS

DEFINITIONS

**8. PRODUCTION SCHEDULE:** Provisional schedule for preparation of the publication, outlining realistic expected dates for each step:

	A*	B*	C*
STEP 1: Preparing a DPP	DONE	DONE	DONE
STEP 2: Internal review of the DPP (Approval by the Coordination Committee)	March 2022		
STEP 3: Review of the DPP by the review Committee(s) (Approval by review Committee(s))	June 2022		
STEP 4: Review of the DPP by the CSS (approval by CSS) or information of the CSS on the DPP	November 2022		
STEP 5: Preparing the draft publication	April 2023		
STEP 6: First internal review of the draft publication (Approval by the Coordination Committee)	April 2023		
STEP 7: First review of the draft publication by the review Committee(s) (Approval for submission to Member States for comments)	June 2023		
STEP 8: Soliciting comments by Member States	December 2023		
STEP 9: Addressing comments by Member States	January 2024		
STEP 10: Second internal review of the draft publication (Approval by the Coordination Committee)	April 2024		
STEP 11: Second review of the draft publication by the review Committee(s) (Approval of the draft)	November 2024		
STEP 12: (For Safety Standards) Editing of the draft publication in MTCDD and endorsement of the draft publication by the CSS (For nuclear security guidance) DDG's decision on whether additional consultation is needed, establishment by the Publications Committee and editing	April 2025		
STEP 13: Approval by the Board of Governors (for SF and SR only)			
STEP 14: Target publication date	December 2025		

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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

It is estimated that the development of the document would involve approximately 24 person-weeks of effort by Member States' experts. This is based upon assuming 3 one-week consultancy meetings involving no more than

7 experts, a one-week technical meeting to facilitate Member States review, and an average of one week of work for preparation, when expert is participating in a meeting.

Secretariat resources involved are estimated at 12 person-weeks of effort by Agency staff plus support for experts' travel and honoraria for experts whose effort is not otherwise funded.

## **ANNEX**

*(For a revision of a publication, or an addendum to a publication, or for revision by batch, attach the gap and feedback analysis report. For a new publication attach the gap analysis report.)*