

**Document Preparation Profile (DPP)  
Version 1.2 dated 7 July 2017**

## **1. IDENTIFICATION**

**Document Category:** Specific Safety Guide

**Working ID:** DS503

**Proposed Title:** Protection against Internal and External Hazards in the Operation of Nuclear Power Plants

**Proposed Action:** Revision of a document  
Safety Guide, NS-G-2.1 'Fire Safety in the Operation of Nuclear Power Plants' (2000)

**Review Committee(s):** NUSSC, RASSC, NSGC, EPRESC

**Technical Officer(s):** Jun SUGAHARA (NSNI/OSS)

**Other Operational Safety Section (OSS) staff members**

## **2. BACKGROUND**

Most of the IAEA safety standards in the domain of NPP operational safety were published in the period 2000–2002 and represent the international consensus on operational safety which existed at that time. In accordance with the IAEA's approach of reviewing and revising, if necessary, its safety standards every ten years, the IAEA conducted a Technical Meeting in November 2015 to review the need for the revision of these safety standards. The TM concluded that the Safety Guide NS-G-2.1 'Fire Safety in the Operation of Nuclear Power Plants' (2000) should be revised with the objective to widen its scope to cover operational aspects for at least all internal hazards or even for all internal and external hazards, because the other hazards are not addressed in the safety guides in NPP operational domain. The current DPP has been developed based on the conclusions from this TM.

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

The Safety Guide NS-G-2.1 was issued in 2000 and is therefore due for review. Its scope is limited to fire safety. In the light of the Fukushima Daiichi Accident it has become clear that a wider range of external hazards and their combination must be addressed in operational safety terms, owing to their potential to challenge the fundamental safety functions of an operating NPP.

Therefore, a review and revision of the Safety Guide to cover operational aspects for all internal and external hazards is deemed necessary.

The DPP takes into consideration:

- Principles of the Vienna Declaration on Nuclear Safety (February 2015);
- Requirements 22, 23, 28, 31 and 32 of SSR-2/2 (Rev.1);
- Recommendations of the Technical Meeting to Review the IAEA Safety Guides on NPP Operational Safety (IAEA&EC JRC, 16-20 November 2015, Brussels, Belgium);

- DS497 (approved by the CSS in November 2016) which calls for the revision of 8 Safety Guides in NPP operational domain;
- Observations and lessons from the Director General's report on the Fukushima Daiichi Accident (August 2015) which mentioned the need for corrective actions or corresponding prevention/mitigation measures to be implemented promptly.

#### **4. OBJECTIVE**

The objective of the revision of the Safety Guide NS-G-2.1 is to improve its applicability by widening the scope to include all internal and external hazards including their possible combinations . The new Safety Guide is expected to be used by NPP operating organizations, technical support organizations, regulatory authorities and other governmental organizations staff members, as appropriate.

In approach, the revised Safety Guide will be in line with the requirements in SSR-2/2 (Rev. 1) and the principles of the Vienna Declaration on Nuclear Safety. Because the Safety Guide will be closely interrelated with the Safety Guides that will be revised under DS497, development of this Safety Guide and those covered by DS497 will be done in close coordination and in parallel. A specific, effective coordination mechanism between all the different groups that will work on the development/revision of the guides will be established.

#### **5. SCOPE**

Safety Guide NS-G-2.1 will be revised to become the Agency's stand-alone guide for Protection against Internal and External Hazards in the Operation of NPPs (Malicious acts are out of the scope although the mitigation of consequences of malicious acts similar to those of non-malicious acts are addressed). The most relevant changes and topics that this revision will bring are as follows:

- The scope will be widened to cover operational aspects for all internal and external hazards in line with the Safety Guides for the protection against internal and external hazards in the design of NPPs.
- In general, the terminology used will be made consistent with the definitions in the current Safety Requirements and the Safety Glossary (2016 Edition).
- The existing recommendations will be reformulated as necessary to meet the current requirements in SSR-2/2 (Rev.1).
- The Safety Guide will propose a common approach to address operational aspects for the hazards and address applicable combination of hazards.

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

The new Safety Guide falls within the thematic area of operational safety and will interface with the following IAEA Safety Standards (this should not be regarded as an exclusive or exhaustive list):

- GSR Part 2 : Leadership and Management for Safety (2016);

- GSR Part 4 (Rev.1): Safety Assessment for Facilities and Activities (2016);
- GSR Part 7: Preparedness and Response for a Nuclear or Radiological Emergency (2015);
- NS-R-3 (Rev. 1) Site Evaluation for Nuclear Installations(2016), under revision by DS484;
- SSR-2/1 (Rev.1): Safety of Nuclear Power Plants: Design (2016);
- SSR-2/2 (Rev.1): Safety of Nuclear Power Plants: Commissioning and Operation (2016);
- NS-G-1.5: External Events Excluding Earthquakes in the Design of Nuclear Power Plants (2003), under revision by DS498;
- NS-G-1.6: Seismic Design and Qualification for Nuclear Power Plants (2003), under revision by DS490;
- NS-G-1.7: Protection against Internal Fires and Explosions in the Design of Nuclear Power Plants (2004), under revision by DS494;
- NS-G-1.11: Protection against Internal Hazards other than Fires and Explosions in the Design of Nuclear Power Plants (2004), under revision by DS494;
- NS-G-2.13: Evaluation of Seismic Safety for Existing Nuclear Installations (2009);
- NS-G-2.15: Severe Accident Management Programmes for Nuclear Power Plants (2009), under revision by DS483;
- DS497: Nuclear Power Plants Operation (revision of NS-G-2.2 to NS-G-2.8 and NS-G-2.14);
- GS-G-3.5: The Management System for Nuclear Installations (2009).

## 7. OVERVIEW

The new Safety Guide will have a structure in line with the other Safety Guides in NPP operational safety domain.

It is planned that the Safety Guide will address operational aspects specifically for the following hazards:

1. Internal hazards
  - Internal fire
  - Internal explosion
  - Missiles
  - Collapse of structures and falling objects
  - Pipe breaks (Pipe failures and their consequences including Pipe whip and Jet effects, Steam release)
  - Internal floods
  - Release of hazardous substances (Asphyxiant and toxic gases, corrosive and radioactive fluids)
  - Electromagnetic interference
2. External hazards
  - Earthquake
  - Volcanism

- External floods including Tsunami
- Extreme winds (including Tornadoes, Tropical cyclones)
- Other meteorological hazards (including lightning strikes, extreme temperatures)
- Biological phenomena
- Collisions of floating bodies with water intakes and ultimate heat sink (UHS) components
- Electromagnetic interference (including Solar Storm)
- External fire
- External explosion including Missiles and Shockwaves
- Accidental aircraft crash
- Release of hazardous substances (Asphyxiant and toxic gases, corrosive and radioactive fluids)

There will be aspects of these hazards that receive a common treatment, but each of these hazards may also need some specific considerations. In general, for each hazard, the following topics will be addressed in the Safety Guide:

- Operational measures for prevention of consequence of the hazard or minimization of their magnitude
- Operational measures for detection and mitigation of consequence of the hazard (for fire hazard, and other hazards if applicable)
- Operational measures for prevention or limitation of the propagation of the adverse effects of consequence of the hazard to other areas in the plant, including secondary effects (for fire hazard and the other hazards if applicable)

These points will be fully applicable for some hazards such as internal fire. For other hazards, some of these points may not be applicable or may need only a simplified treatment. The global structure of the list of contents will be the following:

1. INTRODUCTION
  2. ORGANIZATION AND RESPONSIBILITIES
  3. APPLICATION OF DEFENCE IN DEPTH
  4. PERIODIC UPDATING OF HAZARD ANALYSES
  5. ENSURING SAFETY AGAINST INTERNAL HAZARDS IN THE OPERATION OF NPPs
  6. ENSURING SAFETY AGAINST EXTERNAL HAZARDS IN THE OPERATION OF NPPs
  7. COMBINATION OF HAZARDS
  8. IMPACT OF PLANT MODIFICATION
  9. CONTROL OF MATERIALS AND HOUSEKEEPING
  10. INSPECTION, MAINTENANCE AND TESTING OF PROTECTION MEASURES
  11. TRAINING OF PERSONNEL
- REFERENCES  
APPENDICES

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

STEP 1: Preparing a DPP	DONE
STEP 2: Approval of DPP by the Coordination Committee	DONE

STEP 3: Approval of DPP by the relevant review Committees	Q2 2017
STEP 4: Approval of DPP by the CSS	Q4 2017
STEP 5: Preparing the draft (TM to be organized)	Q1-Q3 2018
STEP 6: Approval of draft by the Coordination Committee	Q4 2018
STEP 7: Approval by the relevant review Committees for submission to Member States for comments Consultation with all SSC on possible restructuring of the safety guides and preparing of one guide	Q1 2019
STEP 8: Soliciting comments by Member States	Q2 2019
STEP 9: Addressing comments by Member States	Q4 2019
STEP 10: Approval of the revised draft by the Coordination Committee Review in NS-SSCS	Q1 2020
STEP 11: Approval by the relevant review Committees	Q2 2020
STEP 12: Endorsement by the CSS	Q4 2020
STEP 13: Establishment by the Publications Committee	Q1 2021
STEP 14: Target publication date	Q4 2021

## 9. RESOURCES

Staff: 30 staff weeks

Consultants: 15 consultant weeks