

**Document Preparation Profile (DPP)
Version 1.0 dated 8 November 2016**

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 (TBD)

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 (malicious acts are out of the scope), 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 a similar way as for DS497, a two-step approach is proposed for the development of the revised Safety Guide.

Step 1:

- Full revision of the Safety Guide to cover all internal and external hazards in NPP operation; e.g. new guide in line with the requirements in SSR-2/2 (Rev. 1) and the principles of the Vienna Declaration on Nuclear Safety. Due to the fact that the Safety Guide will be closely interrelated with the Safety Guides that will be revised under DS497, development of this Draft Safety Guide and 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.

Step 2:

- Once the revised Safety Guide has been developed and the Safety Guides under DS497 have been updated, the same process will be applied as proposed in the DS497 - either publishing a single guide or publishing all the Safety Guides in a form of one single guide with different volumes, thus keeping the structure of the Safety Guides on NPP operation intact and consistent with the Safety Requirements SSR-2/2 (Rev.1) and following the intention of the Long Term Structure of the IAEA Safety Standards to reduce the total number of safety standards, combine some guides and eliminate unnecessary duplication of contents.
- At this stage, the opportunity will be taken to link the Safety Guides on NPP operation to those which will be developed under GSR Part 2 and, thus, avoid inconsistency on issues related to integrated management systems, systemic approach to safety and safety culture.

5. SCOPE

The 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). The most relevant changes and topics that this revision will bring are the following:

- 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 is not, and cannot be, regarded as an exclusive or exhaustive list):

- 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);
- 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, Pipe whip and Jet effects)
 - Internal floods
 - Release of hazardous substances (Asphyxiant and toxic gases, corrosive and radioactive fluids)
 - Electromagnetic interference
2. External hazards
 - Earthquake
 - Accidental aircraft crash
 - External fire
 - External explosion including Missiles and Shockwaves
 - Release of hazardous substances (Asphyxiant and toxic gases, corrosive and radioactive fluids)
 - Electromagnetic interference
 - External floods including Tsunami
 - Other meteorological hazards
 - Biological phenomena
 - Volcanism
 - Collisions of floating bodies with water intakes and ultimate heat sink (UHS) components

There will be aspects for these hazards receiving a common treatment, but each of these hazards needs also 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 the 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 like internal fire. For other hazards, some of these points would not be applicable or 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. INTERNAL HAZARDS TO BE CONSIDERED IN THE OPERATION
6. EXTERNAL HAZARDS TO BE CONSIDERED IN THE OPERATION
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:

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| STEP 1: Preparing a DPP | DONE |
| STEP 2: Approval of DPP by the Coordination Committee | Q4 2016 |
| 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: 20 staff weeks

Consultants: 10 consultant weeks