

Document Preparation Profile (DPP) Version 0.6, 25 Jan. 2019

1. IDENTIFICATION

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

Specific Safety Guide

Working ID: DS520

Proposed Title: External Human Induced Hazards in Site Evaluation for Nuclear Installations

Proposed Action: Revision of Safety Guide NS-G-3.1, External Human Induced Events in Site Evaluation for Nuclear Power Plants (2002)

Review Committee(s) or Group: NUSSC, WASSC

Technical Officer(s): Shin Morita (EESS/NSNI)

2. BACKGROUND

This specific safety guide will supersede the IAEA safety guide NS-G-3.1, “External Human Induced Events in Site Evaluation for Nuclear Power Plants” and expand the scope from NPP to all nuclear installations.

NS-G-3.1 was published in 2002 to provide recommendations and guidance for fulfilling the requirements of the Safety Requirements publication 50-C-S, “Code on the Safety of Nuclear Power Plants: Siting” of 1988. In 2003, 50-C-S was superseded by NS-R-3, “Site Evaluation for Nuclear Installations”, which was later revised by amendment and published in 2016 as NS-R-3 (Rev.1). NS-R-3 (Rev.1) is currently under full revision, and the revised text (DS484) was approved by the CSS and the Publication Committee in November 2018.

The IAEA Safety Guide NS-G-1.5 for the design of nuclear power plants against external events excluding earthquakes is currently being revised (DS498) and its scope extended to all nuclear installations. The revision of NS-G-3.1 will ensure consistency with NS-G-1.5 concerning both the contents and the scope of human-induced external hazards.

3. JUSTIFICATION FOR THE PRODUCTION OF THE DOCUMENT

The revised safety guide will provide guidance to evaluate hazards associated with human induced events. It will directly support Requirement 24 and the related paragraphs 5.33 to 5.37 of DS484 (future SSR-1).

The current safety guide NS-G-3.1 concerning external human induced events covers nuclear power plants only, and a guide for other nuclear installations is missing. While revising this guide, expanding the scope in this way is more efficient and friendly to users than developing separate safety guides for nuclear installations other than nuclear power plants. Covering all nuclear installations in the new series of site evaluation guides is the approach taken by other related safety guides, notably SSG-9, SSG-18 and SSG-21.

The current safety guide NS-G-3.1 issued in 2002 needs an update addressing the following issues:

- Major changes in the requirement documents in higher hierarchy (NS-R-3 (Rev.1) and upcoming revision DS484);
- Considerations fulfilling the gap between the existing publication and the practices in IAEA Member States;
- Evolution of the techniques and advancement of technology in the assessment of external human-induced hazards.

The major changes mentioned above include the issues highlighted after the Fukushima Daiichi NPP accident, many of which were captured in NS-R-3 (Rev. 1) and DS484. For instance, the new safety guide will need to consider provisions on the levels of hazards accounting for their uncertainties, provisions of managing events occurring in combination, provisions for a site with multiple facilities, and periodic reviews of site-specific hazards.

Furthermore, the terminology used needs to be revised and made consistent with the new definitions in the safety requirements and the safety glossary (2016 edition).

The revision will take into consideration feedback from technical safety review services, advisory services, and comments and practices shared during a technical meeting scheduled in April 2019. This technical meeting will aim at discussing practices and methodologies of evaluating external human-induced hazards in site evaluation for nuclear installations.

4. OBJECTIVE

The main objective of the revised safety guide is to provide recommendations and guidance on how to meet the applicable requirements of external human induced hazards for the evaluation of sites of nuclear installations. The second objective is to align the guidance to the current international state of practice consistent with the safety requirements in IAEA Member States.

5. SCOPE

The scope of the facilities covered by the proposed guide will be expanded from nuclear power plants in NS-G-3.1 to all nuclear installations in the revision.

The scope of the hazards to be covered by the proposed guide will be kept the same as in the existing safety guide, unless there is a strong need expressed by IAEA Member States for adding a new human-induced hazard. At the time of writing this preparation profile, the secretariat identifies no need for additional human-induced phenomena to be included in the revised safety guide to the existing list of hazards (listed as in the Annex).

The process to evaluate hazards consists of: a) identification of sources, b) identification of potential external events of the sources, c) screening of the potential external events, d) evaluation of hazards and e) characterization of loading conditions. The proposed guide will cover the process of site evaluation up to this point. The Draft Safety Guide DS498 (revision of NS-G-1.5) will cover the process of design of nuclear installations against external hazards excluding earthquakes, which includes f) design and evaluation of structures, systems and components and g) performance, assessment and acceptance criteria of the nuclear installation.

Evaluation of the effects of wilful human actions or malicious acts on nuclear installations are not included in the scope of this safety guide. The external human-induced events considered in the proposed guide will be of accidental origin. However, the methods to be described in it have some implications to evaluating impacts (for instance, pressure waves, heat, projectiles) of all external human-induced events.

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 site 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):

- Site Evaluation for Nuclear Installations (DS484, revision of NS-R-3 (Rev.1))
- Safety of Research Reactors (SSR-3)
- Safety of Nuclear Fuel Cycle Facilities (SSR-4)
- Leadership and Management for Safety (GSR Part 2)
- Safety Assessment for Facilities and Activities (GSR Part 4 (Rev.1))
- Seismic Hazards in Site Evaluation for Nuclear Installations (DS507, revision of SSG-9)
- Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations (SSG-18)
- Volcanic Hazards in Site Evaluation for Nuclear Installations (SSG-21)
- Design of Instrumentation and Control Systems for Nuclear Power Plants (SSG-39)
- Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants (DS440)
- Protection against Internal Hazards in the Design of Nuclear Power Plants (DS494, revision and combination of NS-G-1.7 and NS-G-1.11)
- External Events Excluding Earthquakes in the Design of Nuclear Installations (DS498, revision of NS-G-1.5)
- Protection against Internal and External Hazards in the Operation of Nuclear Power Plants (DS503, revision of NS-G-2.1)
- Safety Aspects of Nuclear Power Plants in Human Induced External Events: General Considerations (Safety Reports Series No. 86)
- Safety Aspects of Nuclear Power Plants in Human Induced External Events: Assessment of Structures (Safety Reports Series No. 87)
- Safety Aspects of Nuclear Power Plants in Human Induced External Events: Margin Assessment (Safety Reports Series No. 88)

7. OVERVIEW

The proposed safety guide will have a structure consisting of general recommendations, recommendations specific to hazards, recommendations for a graded approach and for the application of the management system.

As for general aspects, the proposed safety guide will address or consider the following:

- The existing recommendations of NS-G-3.1 will be revised to ensure consistency with the future Safety Requirements on Site Evaluation for Nuclear Installations, SSR-1 (currently DS484);
- Application of the management system in site evaluation.

As for technical aspects, the proposed safety guide will address or consider the following:

- As far as reasonably practicable, applicable combinations of external hazards;
- Provisions of monitoring and updating of relevant human activities, industrial activities, infrastructure and provisions of periodic review of hazards;
- Overall review on the applicability of the flow-chart of the existing safety guide;
- More elaboration of methodologies evaluating some of the hazards;
- A graded approach for nuclear installations other than nuclear power plants will be introduced because the scope of the guide will be expanded.

The contents of the proposed safety guide will be similar to the existing safety guide on external human-induced events in site evaluation for NPPs, with some amendments. The planned table of contents is as follows:

1. Introduction
 2. General recommendations
 3. Data collection and investigations
 4. Screening and evaluation procedures
 5. Recommendations of evaluating specific hazards – Aircraft crashes
 6. Recommendations of evaluating specific hazards – Release of hazardous substances
 7. Recommendations of evaluating specific hazards – External explosions
 8. Recommendations of evaluating specific hazards – External fires
 9. Recommendations of evaluating specific hazards – Other external human induced hazards
 10. Evaluation of external human induced hazards for nuclear installations other than nuclear power plants
 11. Application of the management system
- References

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	DONE		
STEP 2: Approval of DPP by the Coordination Committee	Jan. 2019		
STEP 3: Approval of DPP by the relevant review Committees	June 2019		
STEP 4: Approval of DPP by the CSS	Dec. 2019		
STEP 5: Preparing the draft Indicate as to whether a TM is expected to be organized for the preparation of the draft	TM April 2019 Complete Final Draft 1Q 2020		
STEP 6: Approval of draft by the Coordination Committee	2Q 2020		
STEP 7: Approval by the relevant review Committees for submission to Member States for comments	2Q2020		
STEP 8: Soliciting comments by Member States	3Q 2020		
STEP 9: Addressing comments by Member States	1Q 2021		
STEP 10: Approval of the revised draft by the Coordination Committee Review in NSOC-SGDS (Technical Editorial review)	2Q 2021		
STEP 11: Approval by the relevant review Committees	4Q 2021		
STEP 12: Submission to the CSS - Submission in parallel and approval by the Publications Committee - MTCD Editing - Endorsement of the edited version by the CSS	2Q 2022		
STEP 13: Establishment by the Publications Committee and/or Board of Governors (for SF and SR only))	3Q 2022		
STEP 14: Target publication date	4Q 2022		

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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.

Annex: List of human-induced hazards

Impacts of external human-induced hazards on NPPs, mentioned in NS-G-3.1	Initiating events that would generate impacts on NPPs, mentioned in NS-G-3.1
Pressure wave Projectile Heat Smoke and dust Asphyxiant and toxic substances Corrosive and radioactive liquids, gases, and aerosols Ground shaking Flooding (or drought) Subsidence Electromagnetic interference Eddy currents into ground Damage to water intake	Explosion (deflagration, detonation) Fire (external) Release of flammable, explosive, asphyxiant, corrosive, toxic or radioactive substances Aircraft crashes or abnormal flights leading to crashes, collision of planes, projectiles vehicle impacts Ground collapse Blockage or damage to cooling water intake structures Electromagnetic interference Eddy currents into ground