46th Meeting of the Waste Safety Standards Committee

19 – 21 November 2018

Agenda Item W 2.3

Draft Safety Guide DS498: External Events Excluding Earthquakes in the Design of Nuclear Installations (Revision of NS-G-1.5)

‒ For approval for submission to Member States –

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External Events Safety Section
Division of Nuclear Installation Safety (NSNI)
Background

- This Safety Guide supersedes the Safety Guide NS-G-1.5 which was first published in 2003.
- A major revisions are:
  - New structure and content of the document, extending the scope from NPP to all nuclear installations
  - Design and qualification methods and means of protection for nuclear installations,
  - Implementation of safety requirements (DS484, SSR-2/1, SSR-3 and SSR-4)
  - Incorporates the progress in the state of practice and the results of research on the effects of all external events excluding earthquakes.
The DPP was approved by the CSS in April 2017.

The first draft was developed and reviewed in 3 Consultancy Meetings (CS):

- 1\textsuperscript{st} CS meeting in August 2017
- 2\textsuperscript{nd} CS meeting in November 2017
- 3\textsuperscript{rd} CS meeting in June 2018

The draft is now in Step 7.
Scope

- It provides new or updated guidance on:
  - General concept and application of safety criteria to the design of structures, systems and components (SSCs) for protection against external events, load combinations and acceptance criteria,
  - Safety analysis for Design Basis External Events (DBEEs) and Beyond Design Basis External Events (BDBEEs)
  - Categorization of SSCs,
  - Safety Margin,
  - Technical recommendations for good engineering practice.
Proposed Structure

1. INTRODUCTION
   BACKGROUND
   OBJECTIVE
   SCOPE

2. GENERAL CONCEPT AND APPLICATION OF SAFETY CRITERIA TO THE DESIGN FOR PROTECTION AGAINST EXTERNAL EVENTS
   APPLICABLE DESIGN REQUIREMENTS
   MEETING SAFETY REQUIREMENTS
   SAFETY MARGIN
   STRUCTURES, SYSTEMS AND COMPONENTS TO BE PROTECTED AGAINST EXTERNAL EVENTS
   GUIDELINES FOR DESIGN AND EVALUATION FOR DBEs AND BDBEs
   DESIGN SAFETY FEATURES FOR DBEs
   ADMINISTRATIVE MEASURES

3. DESIGN BASIS FOR EXTERNAL EVENTS
   DERIVATION OF THE DESIGN BASIS FROM THE SITE HAZARD ANALYSIS
   OVERALL DESIGN APPROACH
   DERIVATION OF DBE CAPACITY CONDITIONS: GENERAL CONSIDERATIONS
   DERIVATION OF DBE CAPACITY CONDITIONS: SPECIFIC
   BEYOND DESIGN BASIS EXTERNAL EVENTS: EVALUATION OF BDBEs — CLIFF EDGE EFFECTS

4. PLANT LAYOUT AND APPROACH TO BUILD DESIGN
   INSTALLATION LAYOUT
   APPROACH TO STRUCTURAL DESIGN
   APPROACH TO STRUCTURAL ASSESSMENT FOR BEYOND DESIGN BASIS EVENTS

5. SAFETY DESIGN PROVISIONS AGAINST EXTERNAL EVENTS
   5.1. EXTERNAL FLOODS, INCLUDING TSUNAMI
      MEANS OF PROTECTION
      COASTAL SITE
      RIVER SITE
      ESTUARY SITE
      ASSESSMENT FOR BEYOND DESIGN BASIS EXTERNAL FLOODS
   5.2. EXTREME WINDS
      INTERFACE WITH HAZARD ASSESSMENT
      LOADING
      DESIGN AND QUALIFICATION METHODS
      MEANS OF PROTECTION
      ASSESSMENT FOR BEYOND DESIGN CONDITIONS
   5.3. OTHER EXTREME METEOROLOGICAL CONDITIONS
      LOADING
      DESIGN METHODS AND MEANS OF PROTECTION
      ASSESSMENT FOR BEYOND DESIGN CONDITIONS
   5.4. VOLCANISM
      DESIGN METHODS AND MEANS OF PROTECTION
      DESIGN BASIS AND BEYOND DESIGN CONDITIONS
   5.5. EXTERNAL FIRE
      LOADING
      DESIGN METHODS
      MEANS OF PROTECTION

5.6. EXTERNAL EXPLOSIONS
   INTERFACE WITH HAZARD ASSESSMENT
   LOADING
   DESIGN AND QUALIFICATION METHODS
   MEANS OF PROTECTION
   ASSESSMENT FOR BEYOND DESIGN CONDITIONS

5.7. ASPHYXIANT, TOXIC GASES, TOXIC AND CORROSIVE CHEMICALS AND FLAMMABLE VAPOUR CLOUDS
   INTERFACE WITH HAZARD ASSESSMENT
   DISPERSION
   DESIGN AND QUALIFICATION METHODS
   MEANS OF PROTECTION
   ASSESSMENT FOR BEYOND DESIGN CONDITIONS

5.8. RADIOACTIVE HAZARDS FROM ALL ON-SITE AND COLLOCATED INSTALLATIONS
   INTERFACE WITH HAZARD ASSESSMENT
   DESIGN AND QUALIFICATION METHODS
   MEANS OF PROTECTION

5.9. AIRCRAFT CRASH
   GENERAL DISCUSSION
   LOADING AND STRUCTURE
   VIBRATION EFFECTS
   FUEL EFFECTS
   ASSESSMENT FOR BEYOND DESIGN BASIS AIRCRAFT CRASH

5.10. ELECTROMAGNETIC INTERERENCE

5.11. BIOLOGICAL PHENOMENA
   DESIGN METHODS AND MEANS OF PROTECTION

5.12. COLLISIONS OF FLOATING BODIES WITH WATER INTAKES AND UHS COMPONENTS
   INTERFACE WITH HAZARD ASSESSMENT
   LOADING
   DESIGN AND QUALIFICATION METHODS
   MEANS OF PROTECTION
   ASSESSMENT FOR BEYOND DESIGN CONDITIONS

5.13. OTHER EXTERNAL HAZARDS

5.14. COMBINATION OF HAZARDS

6. SAFETY DESIGN PROVISIONS FOR NUCLEAR INSTALLATIONS OTHER THAN NUCLEAR POWER PLANTS

7. APPLICATION OF MANAGEMENT SYSTEM

REFERENCES

LIST OF ABBREVIATIONS

CONTRIBUTORS TO DRAFTING AND REVIEW
Comments and Resolutions

We received 152 comments from: Finland, France, India, Japan, Republic of Korea, Pakistan, Sweden, Ukraine, USA, ENISS and WNA

• All comments were addressed and there are no unresolved comments.

• Tables with comments resolution and the updated draft have been uploaded on NUSSC and WASSC website on November 8th, 2018.
Comments and Resolutions

Summary of Comments Resolution

- **53%** Accepted
- **41%** Rejected
- **6%** Acc. M.
you are kindly requested to approve the submission for MS comments
Thank you!
## Comments and Resolutions

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