Document Preparation Profile (DPP)
Version 2
3 November 2014

1. IDENTIFICATION

Document Category: **Specific Safety Requirements**

Working ID: **DS484**

Proposed Title: **Site Evaluation for Nuclear Installations**

Proposed Action: **Revision of a document**

Safety Requirement Series, NS-R-3 "Site Evaluation for Nuclear Installations", 2003

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

Technical Officer(s): **Sujit Samaddar & Jehad Haddad**

2. BACKGROUND/RATIONALE

The Safety Requirements NS-R-3 Publication "Site Evaluation for Nuclear Installations", issued in 2003 establishes requirements and provides criteria for ensuring safety and adequate protection in site evaluation for nuclear installations.

The revision to the NS-R-3 publication proposed in this DPP is to incorporate input and feedback received from Member States during the technical meeting on "Revision of the Safety Requirements Publication NS-R-3" which was organized by the International Seismic Safety Center (ISSC) in December, 2012 at IAEA in Vienna. The input and feedback received was based on the Member States experience with issues arising from recent developments related to site evaluation and hazard assessment, operational experience, and site evaluation of existing and new nuclear installations. A feedback summary of these issues and recommendations, proposed by the participants to be addressed in the revision of the NS-R-3, is attached in Appendix I.

The revision to the NS-R-3 publication is also intended to complement the current revisions to the NS-R-3 under the DS462 Amendments to the IAEA Safety Requirements initiated in response to the IAEA Action Plan on Nuclear Safety (GOV/2011/59-GC (55)/14) which included an action to "Review and strengthen IAEA Safety Standards and improve their

implementation" to incorporate the results of the gap analysis on the safety requirements based on the feedback and lessons learned from the TEPCO's Fukushima Daiichi nuclear power plant accident.

In general, the revisions and updating of the NS-R-3 publication will include adding newly developed standard sections and adopt the publication to the new style used in recently updated and revised Safety Standards (with numbered bold 'overarching' requirements).

General requirements will include modifications and clarifications, as necessary, to the Safety Requirements and siting criteria to incorporate the topical issues raised by the participants from the Member States, IAEA staff and experts. This will cover elaboration on the site evaluation requirements for multi-unit installations; multi hazards/combination of hazards, particularly, high consequences low probability events; and periodic monitoring and evaluation of factors that changes with time such natural and human-induced hazards, site and regional conditions, data collection and validation methodologies.

Specific requirements for Evaluation of External Events will include elaborating on the Safety Requirements, as necessary, on considering additional phenomena such climate change, extra-tropical cyclones and non-seismically induced tsunamis and their effects on the safety of the nuclear installation; data validation, and confidence levels in hazard estimations and assessment; and considerations for the impact of external hazards on the site infrastructures and feasibility of emergency planning.

Site Characteristics and Potential Effects on the Nuclear Installations in the Region will also include clarification to the Safety Requirements that cover the interaction between groundwater and surface water; other chemicals and leaching agent at the site; and radiological dispersion, transport and modelling through multiple media.

Monitoring of Hazards Requirements will also be evaluated and include elaboration on the analysis and use of monitoring data; reservation and accessibility of monitoring data and periodic evaluation and identification of trends.

Quality Assurance Requirements will also be evaluated and include elaboration to reflect the use of the most recent Management System (MS) concept in site evaluation in specific MS requirements which cover Quality Assurance.

The proposed revisions and modifications will be built on the Safety Requirements of the current NS-R-3 publication and demonstrate IAEA's commitment to provide Member States with comprehensive and up-to-date safety requirements which satisfy and reflect the general consensus among States.

3. OBJECTIVE AND SCOPE

The objective of this revision is to incorporate the input, feedback and recommendations from the December 2012 technical meeting on the "Revision of the Safety Requirements Publication NS-R-3" into a revised Safety Requirements document that is consistent with the whole set of requirements as well as in conjunction to the approved revisions and changes to the NS-R-3 in the DS462 Amendments to the Safety Requirements.

The scope of this publication, will follow the scope of the NS-R-3, and will cover site related factors and site-installation interaction factors that are important to safety during operational and accident conditions and emergency planning. The scope will cover the site related factors that have to be considered to ensure that the site-installation combination does not constitute an unacceptable risk to the people and the environment over the lifetime of the installation. The scope of work will cover general and specific siting requirements, site characterization requirements and the impact of the nuclear installation on the region. Monitoring of external hazards and for site safety review and decommissioning plans will be also covered, as well as management system requirements.

External events of natural and human-induced accidental origin and combination of them when appropriate are only considered while considerations related site physical protection of the installation against willful and deliberate actions by a third party will be outside the scope of this publication. In addition, non-radiological hazards of a nuclear installation will be outside the scope of this publication. However site security related aspects will be considered.

The revised publication is intended to be used by Member States in their site evaluation of existing and new nuclear installations and in developing and updating their own safety requirements and regulations if necessary.

4. JUSTIFICATION FOR THE PRODUCTION OF THE DOCUMENT

The input and feedback from Member States on the revision of the NS-R-3 resulted from the technical meeting support and justify the need for a comprehensive revision of the NS-R-3 publication that cover technical areas other than the one included under the DS462 Amendments to the IAEA Safety Requirements in response to the TEPCO's Fukushima Daiichi NPP accident.

The completion of a revised and comprehensive NS-R-3 publication by December 2016 will be useful to Member States to implement updated safety requirements in their activities related to site evaluation for new and existing nuclear installations.

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

The revised document will be established, as the Specific Safety Requirements publication No. SSR-1, in the long term structure of the IAEA Safety Standards Series. This document will interface with the following IAEA publications (the list is not intended to final or exhaustive) :

1. Fundamental Safety Principles, IAEA Safety Standards Series No. SF-1, (2006);
2. SSR-2/1: Safety of Nuclear Power Plants: Design; (2012);
3. SSR-2/2: Safety of Nuclear Power Plants: Commissioning and Operation; (2011);
4. GSR Part 1: Governmental, Legal and Regulatory Framework for Safety, (2010);
5. GSR Part 3: Radiation Protection and Safety of Radiation Sources, International Basic Safety Standards, (2014);
6. GSR Part 4: Safety Assessment for Facilities and Activities, (2009);
7. GSR Part 5: Predisposal Management of Radioactive Waste, (2009);
8. NS-R-4: Safety of Research Reactors, (2005) (under revision DS476);
9. NS-R-5 Rev.1 Safety of Nuclear Fuel Cycle Facilities (2014) (under revision DS478);
10. DS456: Leadership and Management of Safety (Revision of the GS-R-3);
11. DS462: Revision through addenda of GSR- Part 1, NS-R-3, SSR-2/1, SSR-2/2 & GSR Part 4;
12. DS457: Preparedness and Response for a Nuclear or Radiological Emergency Safety Requirements, (Revision of the GS-R-2);
13. NS-G-1.5: External Events Excluding Earthquakes in the Design of Nuclear Power Plants, (2003);
14. NS-G-1.6: Seismic design and qualification for NPPs (2003);
15. NS-G-1.13 Radiation Protection Aspects of Design for Nuclear Power Plants (2005);
16. NS -G-3.1: External Human Induced Events in Site Evaluation for Nuclear Power Plants, (2002);

17. NS-G-3.2: Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants, (2002) (under revision DS427);
18. NS-G-3.6: Geotechnical Aspects of Site Evaluation and Foundations for Nuclear Power Plants, (2004);
19. SSG-9: Seismic Hazards in Site Evaluation for Nuclear Installations, (2010);
20. SSG-15: Storage of Spent Nuclear Fuel (2012)
21. SSG-18: Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations, (2011);
22. SSG-25: Periodic Safety Review for Nuclear Power Plants, (2013);
23. SSG-21: Volcanic Hazards in Site Evaluation for Nuclear Installations, (2012);
24. Nuclear Security Series: NSS No. 13, Nuclear security recommendations on physical protection of nuclear material and nuclear facilities (INFCIRC/225/Revision 5, 2011);
25. Nuclear Security Series: NSS No. 14, Nuclear Security Recommendations on Radioactive Material and Associated Facilities; (2011); and
26. Nuclear Security Series: NSS No. 20 Objective and Essential Elements of a State's Nuclear Security Regime (2013).

6. OVERVIEW

The revisions are not expected to substantially affect the current table of content of the NS-R-3 publication, but the structure of the publication will be updated to reflect the new style and standard sections used in the most recently updated Safety Requirements publications.

The content of the proposed new or modified paragraphs will be based on the review of the Safety Standards Committees, the Member States and the Commission on Safety Standards on their implications for the Safety Requirements.

The input, feedback and recommendations from the technical meetings with the participation of the Member States will provide the starting point of the topical areas to be addressed. The terminology used in the revision will be consistent with the IAEA Safety Glossary.

The following is a proposed draft to the structure of the revised publication:

CONTENTS

1. INTRODUCTION

Background
Objective
Scope
Structure

2. GENERAL REQUIREMENTS

Objective
Uses for site evaluation
General criteria
Criteria for hazards associated with external natural and human induced events
Criteria for determining the potential effects of the nuclear installation in the region
Criteria derived from considerations of population and emergency planning

3. SPECIFIC REQUIREMENTS FOR EVALUATION OF EXTERNAL EVENTS

Earthquakes and surface faulting
Meteorological events
Flooding and Tsunami
Geotechnical hazards
External human induced events
Other important considerations

4. SITE CHARACTERISTICS AND THE POTENTIAL EFFECTS OF THE NUCLEAR INSTALLATION IN THE REGION

Atmospheric dispersion of radioactive material
Dispersion of radioactive material through surface water
Dispersion of radioactive material through groundwater
Population distribution
Uses of land and water in the region
Ambient radioactivity

5. MONITORING OF HAZARDS

6. MANAGEMENT SYSTEM

REFERENCES
DEFINITIONS *(in addition to those in the IAEA Safety Glossary)*
CONTRIBUTORS TO DRAFTING AND REVIEW
BODIES FOR THE ENDORSEMENT OF SAFETY STANDARDS

7. PRODUCTION SCHEDULE:

STEP 1: Preparing a DPP	September 2013
STEP 2: Approval of DPP by the Coordination Committee	October 2013
STEP 3: Approval of DPP by the relevant review Committees	June 2014
STEP 4: Approval of DPP by the CSS	November 2014
STEP 5: Preparing and submitting the draft	April 2015
STEP 6: Approval of draft by the Coordination Committee	April 2015
STEP 7: Approval by the relevant review Committees for submission to Member States for comments	June 2015
STEP 8: Soliciting comments by Member States	July-Nov. 2015
STEP 9: Addressing comments by Member States	Feb 2016
STEP 10: Approval of the revised draft by the Coordination Committee Review in NS-SSCS	April 2016
STEP 11: Approval by the relevant review Committees for submission to the CSS	June 2016
STEP 12: Endorsement by the CSS	November 2016
STEP 13: Establishment by the Board of Governors	March 2017
STEP 14: Target publication date	2017

8. RESOURCES

Secretariat: 2 P (0.30 Man-year) and 1 G staff (0.2 Man-year) + TM Meeting (6-Man weeks of no-staff) + 2 CS Meetings (6 Man-weeks of non-staff) + 3 Contracts under SSA

Appendix I

Feedback Summary

Feedback Summary
Technical Meeting on
Revision of the Safety Requirements Publication:
Site Evaluation for Nuclear Installations
3–5 December 2012, IAEA Headquarters, Vienna, Austria

Issues to be addressed in the revision of the NS-R-3

Introduction

1) Describe the full site selection and site evaluation process
2) Link/Interface between NS-R-3 and SSR 2/1 (Design requirement) , what output will be input to design can be explained better

General Requirements

3) Multi-unit site issue
4) Multi-hazard issue (combination of hazards) including the time line
5) Change of hazards with time
6) Use appropriate methodologies (validated, appropriate for available data and scope of assessment)
7) Applicability of NS-R-3 to new, existing and collocated sites
8) Confidence level for external hazards parameters used in design
9) Periodic re-evaluation of external hazards
10) Defining scenarios and associated hazards/releases
11) Introduce risk/safety criteria in site suitability
12) Consideration of high consequence low probability events

Specific Requirements for Evaluation of External Events

13) Additional phenomena
    - Climate change
    - Extra-tropical cyclones
    - Non-seismically induced tsunamis and seiches
14) Tsunami due to other source should be addressed

15) Uncertainty in hazard analyses
16) Hazards specific requirements - Interface with BDB hazards safety assessment
17) Identification and screening of external events
18) Potential accident initiated by external events hazard (EEH) and impact to emergency management planning (EMP) / impact to site infrastructure

Site Characteristics and the Potential Effects of the Nuclear Installations in the Region

19) Discussions of dispersion through groundwater and surface water should:
    - Consider accidental releases caused by an external event
    - Consider interactions between groundwater and surface water
    - Stress the need for accurate, site-specific models
    - Describe the presence of other chemicals such as chelating agents that could affect subsurface transport
20) Radiological Dispersion – more specific requirements (reference to dose limits) multi – unit sites issues (source term)
21) Modeling techniques for radiological dispersion
22) Interaction between surface and ground water and factors affecting the transport of radionuclides

Monitoring of Hazards

23) Monitoring of hazards
    - Discuss how monitoring data should be analyzed and used
    - Preservation and accessibility of monitoring data
    - Periodic evaluation and identification of trends

Management System in Site Evaluation

24) MS/QA – update section 6 and add site evaluation specific MS requirements
25) Resolve duplications/overlapping
26) Full revision