

## **Document Preparation Profile (DPP)**

### **1. IDENTIFICATION**

<b>Document Category:</b>	<b>Safety Requirements</b>
<b>Working ID:</b>	<b>DS 414</b>
<b>Proposed Title:</b>	<b>Safety of Nuclear Power Plants: Design</b>
<b>Proposed Action:</b>	<b>To revise the current issue of NS-R-1</b>
<b>Published Title/Date:</b>	<b>Safety of Nuclear Power Plants: Design [2000]</b>
<b>Safety Series No.:</b>	<b>NS-R-1</b>
<b>SS Committee(s):</b>	<b>NUSSC, RASSC, TRANSC, WASSC</b>
<b>Technical Officer:</b>	<b>M. Gasparini</b>

### **2. OBJECTIVE**

The objective of the revision of NS-R-1 is to improve the content of the publication taking into consideration other new published Safety Standards and the feedback received from Member States and from the Design Safety Review Services. The revision of this IAEA Safety Standard is intended to keep the standard updated with the evolution of the technology and nuclear safety and to assure a high level of safety.

### **3. BACKGROUND**

The current publication was issued in the year 2000, and according to the policy of the Agency to periodically review all the safety standards, activities have been carried out by the Secretariat to collect the feed back from Member States on the use and application of NS-R-1. The publication is now a well established Standard, and the Agency has received good feedback in general on its use. Many of the Member States have experience in the application of the NS-R-1 Requirements document, and WENRA has used it as a basis for developing a harmonised approach to selected nuclear safety issues and their regulation. NS-R-1 has been used extensively by the IAEA for conducting Design Safety Reviews, and this has provided further valuable information on its use and applicability. In proposing the update of NS-R-1, it is recognised that stability of current requirements should be maintained as far as possible. A comparison of NS-R-1 with the WENRA Reference Levels was conducted in May 2006 and a Technical Meeting on Safety Developments relating to the Design of Innovative and Evolutionary Nuclear Power Plants, was held at the IAEA Headquarters, from 27 November to 1 December 2006. This meeting broadly addressed the experience of Member States on the use of NS-R-1 and the impact on its revision determined by the publication of the new Safety Fundamentals in 2006.

On the basis of new Safety Standards (Safety Fundamentals and Requirements) and experience on the review of NS-R-1 the following major objectives have been formulated as guidance for its revision:

- 1) to ensure full consistency with the new Fundamental Safety Principles.*
- 2) to take account of the feedback from Member States, from other Organisations, and from the lessons learned from the IAEA safety review services*

*3) to ensure that any proposed changes to NS-R-1 will be such that the impact on the lower tier Safety Guides will be minimised. Furthermore, the changes from the current publication will be clearly identified and a linking document will be produced to summarise the changes and their justification.*

*4) to ensure consistency with other Requirements (see list below) that have been published recently or that are currently under development or revision.*

The activities carried out by the Secretariat for the review of NS-R-1 showed that there are no significant technical concerns with the current publication. However, there is the need of a general formal rearrangement mainly dictated by the issue of the Safety Fundamentals and new requirements (Management system, Safety Assessment). The possibility to formulate, for each topic, a key requirement followed by more specific requirements will be investigated. Identified technical areas that need a general improvement and rationalization are those related to the General Design Basis, Design Basis Accidents and Severe Accidents. Recommendations were received by some Member States to include quantitative safety goals for different plant conditions. This will be considered if appropriate.

#### **4. INTERFACES**

The review will cover other relevant IAEA publications. The primary interface is the Fundamental Safety Principles document SF-1.

The revised requirements will also have interfaces with:

- Safety Requirements NS-R-2: Safety of Nuclear Power Plants: Operation (DS 413),
- Safety Requirements NS-R-3: Site evaluation for Nuclear Installations,
- Safety Requirements GS-R-3: The Management System for Facilities and Activities,
- Safety Requirements GS-R-1: Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety
- Draft Safety Requirements DS 348: Safety Assessment for Facilities and Activities,
- Draft DS 379: International Basic Safety Standards for protection against ionising radiation.

#### **5. OVERVIEW**

The content of the new Requirements document will, to the extent possible, retain the existing structure, modifying it where necessary to enable clear interpretation of the relevant associated Fundamental Principle. It is recognized that during the preparation of the new Safety Fundamentals (SF-1), some principles of the superseded SF-110 were not retained because they were considered to be more appropriate as requirements. This will be taken into consideration to avoid the creation of any gap between SF-1 and the revised NS-R-1. Care will be taken to ensure consistency and coordination with other relevant safety standards.

#### **6. DOCUMENT CONTENTS**

The revised document will follow a similar contents structure to the current version with some simplifications with respect to the current version of NS-R-1. Section 1 will provide the introduction according to the IAEA format. Section 2 will describe the safety foundation and the rationale for the safety requirements. The safety requirements (“shall” statements) will be included in Section 3 and Section 4. Section 3 will provide those general requirements that are applicable to any kind of nuclear power plant. Section 4 will provide requirements for design of plant systems with some emphasis on water cooled reactors.

## 1. INTRODUCTION

Background

Objective

Scope

Structure

## 2. SAFETY OBJECTIVE AND CONCEPTS

Safety objective

Safety functions

The concept of defence in depth

## 3. REQUIREMENTS FOR PLANT DESIGN

Management system

Proven engineering practices

Operational experience and safety research

Safety assessment

Requirements for defence in depth

Accident prevention and plant safety characteristics

Radiation protection and acceptance criteria

Safety classification

General design basis

Design for reliability of structures, systems and components

Provision for in-service testing, maintenance, repair, inspection and monitoring

Equipment qualification

Ageing

Human factors

Systems containing fissile or radioactive materials

Transport and packaging for fuel and radioactive waste

Escape routes and means of communication

Control of access

Interactions of systems

Interactions between the electrical power grid and the plant

Sharing of structures, systems and components between reactors

Power plants used for cogeneration, heat generation or desalination

Decommissioning

#### 4. REQUIREMENTS FOR DESIGN OF PLANT SYSTEMS

Reactor core and associated features

Reactor coolant system

Containment system

Instrumentation and control

Emergency control centre

Emergency power supply

Waste and effluent treatment and control systems

Fuel handling and storage systems

Fire protection systems

Radiation protection

#### REFERENCES

#### CONTRIBUTORS TO DRAFTING AND REVIEW

#### 7. PRODUCTION

##### *Provisional schedule for preparation of the document:*

Approval of DPP by the Steering Committee:	June 2007
Approval of DPP by the Committees:	October 2007
Approval of DPP by the CSS:	November 2007
Development of revised document:	
CSs to prepare the draft:	December 2007, February 2008
TM to review the draft	March 2008
Approval of draft by the Steering Committee:	April 2008
Approval by the Committees for submission to MS:	September 2008
CS to take into account the comments by MS:	March 2009
Approval by the Committees for submission to the CSS:	April 2009
Endorsement by the CSS:	May 2009
Endorsement by the Board of Governors:	June 2009
Submission to the Publications Committee:	July 2009
Target publication date:	October 2009