Application of the ROADMAP - Long-term structure and format of Safety Requirements

**Approved at the September 2008 CSS meeting and modified at the October 2009 meeting**

The objective of this paper is to present in a single document important aspects already addressed in several previous documents and in particular the approved 23 May 2008 roadmap on the long-term structure of safety standards and the CSS Sub-group report part-A issued on 8 February 2007.

A- Structure of safety requirements

Background - Extracts from the roadmap and option discussed within the CSS task-force:

"4) There is now a unique opportunity to draw the inferences from the publication of the single set of Safety Fundamentals and use a combination of a top-down approach and a Requirements gap analysis for the identification of the most efficient and effective structure for the set of Requirements needed to ensure their implementation. The long-term structure should keep the current hierarchy with three level's and take into account the need for stability in regulatory approaches.

5) The intention is to establish a General Safety Requirements integrating all thematic areas in a coherent and harmonized set of publications, complemented by a series of facilities and activities specific Safety Requirements. The complete set of Safety Requirements should address all radiation exposure situations (actual and potential). The General Safety Requirements should apply to any facility/activity (as defined in the footnote of the paragraph 1.9 of the Fundamental Safety Principles SF-1), whereas the others should apply to specific facilities/activities.

11) The BSS is being revised. The result will be a key element among the thematic requirements. It will integrate the new ICRP recommendations. The revision of the BSS should be pursued according to the approved DPP. The possibility of further extending its scope in a second step should be considered so that it can serve as the basis for the future General Safety Requirements. Like for the revision of the BSS, it will involve close consultation of, and collaboration with co-sponsoring organizations about the relationship between the revised BSS and the General Safety Requirements."

6) Safety measures and security measures must be designed and implemented in an integrated manner.

At its September 2007 meeting, the CSS task force concluded that the possibility of further extending the scope of the revised BSS in a second step after its finalization, such that it would serve as the basis for the General Safety Requirements (GSR), was a practical option for the building of the General Safety Requirements. The concept was to construct the future GSR from the requirements on radiation protection and on the safety of radiation sources fully addressed by the revised BSS and, for the other thematic areas, from the additional requirements in GS-R-1, GS-R-2, GS-R-3, WS-R-5, DS348 and DS353, or their revision as appropriate.

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1 Safety Fundamentals, Safety Requirements and Safety Guides
Structure of the safety requirements:

As a result of the above general criteria, the long-term set of Safety Requirements would include a General Safety Requirements applicable to all facilities and activities with a graded approach and composed of a set of publications addressing the following eight themes: Governmental and Regulatory framework, Leadership and Management for Safety, Radiation Protection, Safety Assessment, Predisposal Management of Radioactive Waste, Decommissioning and Termination of Activities, Emergency Preparedness and Response, and Remediation. It will be complemented by a set of Facilities and Activities Specific Requirements.

In terms of set of publications, considering the interactions of the revised BSS with the other themes and the coverage within the revised BSS of the safety of facilities and activities other than nuclear facilities and activities\(^2\), the following set of publications is envisaged with a General Safety Requirements composed of seven volumes:

Vol.1- Governmental and Regulatory framework (on-going revision of GS-R-1, DS415)
Vol.2- Leadership and Management for Safety (future revision of GS-R-3)
Vol.3- Radiation Protection and Safety of Radiation Sources (on-going revision of the BSS, DS379)
Vol.4- Safety Assessment (DS348 or its future revision)
Vol.5- Radioactive Waste Management (revision of WS-R-2, DS353 approved by the CSS for submission to the BoG)
Vol.6- Decommissioning and Termination of Activities (future revision of WS-R-5)
Vol.7- Emergency Preparedness and Response (future revision of GS-R-2)

The existing WS-R-3 on remediation will be included in the section of the revised BSS on existing exposure situations. The future revision of GS-R-2 will focus on the management of emergency preparedness and response activities and refer to the revised BSS for the criteria and radiation protection issues. The revised BSS would keep its self-standing character with adequate references to other thematic areas.

\(^2\) Nuclear facilities and activities are:
- nuclear installations : nuclear power plants, research reactor facilities (including subcritical and critical assemblies), spent fuel storage facilities, nuclear fuel fabrication facilities, conversion facilities, enrichment facilities or reprocessing facilities
- waste management facilities and activities, associated with nuclear installations, including decommissioning but excluding discharges to the environment
- facilities and activities for research and development associated with nuclear installations
- any other facilities and activities in which nuclear material and radioactive material are produced, processed, used, handled, stored or disposed of on such a scale that consideration of nuclear safety is required.
This will be complemented by a set of six Facilities and Activities specific Safety Requirements:

- Site Evaluation for Nuclear Installations (future revision of NS-R-3)
- Safety of Nuclear Power Plants with one volume on design and construction (on-going revision of NS-R-1, DS414) and one volume on commissioning and operation of Nuclear Power Plants (on going revision of NS-R-2, DS413)
- Safety of Research Reactors (future revision of NS-R-4)
- Safety of Nuclear Fuel Cycle Facilities (DS316 and its future revision)
- Safety of Radioactive Waste Disposal Facilities (on going revision of WS-R-1 and WS-R-4, DS354)
- Safe Transport of Radioactive Material (on going revision of TS-R-1, DS345)

Through their development, practical means of ensuring the implementation of the item 6 of the roadmap on safety and security will be investigated and implemented.
B- Definition and format for safety requirements

Background - Extracts from the roadmap Annex B and the CSS Sub-group report part-A:

"The General Safety Requirements and the Specific Safety Requirements include overarching requirements and associated requirements, both expressed as “shall” statements. When necessary short explanations to support the safety requirements are provided. When a compelling justification drives changes to a Safety Requirement the revision should include the adoption of this new format. The status of the explanatory text and the expectations for its use will be made clear. It is also expected that the level of detail in each chapter will be similar (Annex IV of the CSS subgroup report part A elaborates on a better definition of the level of the Safety Requirements with some examples). The main reasons are as follows:

- In term of user-friendliness, the format and style of the safety standards should facilitate their use for the establishment of the regulatory framework (see annex A to the roadmap on user-friendliness). The Safety Requirements should be short enough to encourage their reading and actual use in the Member States;

- In the current set of Safety Requirements, references are often made to specific concepts but their explanation is given in many cases in the subsequent Safety Guides. In the future, it is expected that the explanation of the concepts will be provided in the Safety Requirements so as to facilitate their interpretation for use in establishing national regulatory requirements. The purpose of the Safety Guides will not be to explain these concepts but to focus on the recommendations on how the requirements can be implemented;

- In addition, each individual overarching requirement will be allocated a number which, by appropriate references in the Safety Guides, will help building a logical relationship between the set of safety requirements and the set of safety guides. Thus, after completion of the set of Safety Requirements, the subsequent revision of Safety Guides will refer to these numbers; and

- Requirements must address what must be achieved/done while the guides will address how this could be achieved/done.

With regard to the definition of the safety requirements the CSS Sub-group report part-A presented the overall definition of safety requirements and elaborated on this definition in its Annex IV.

Definition and format for safety requirements:

The overall definition for the future requirements would generally be maintained. It should be slightly modified as not all sentences would be established as shall statements. The revised definition would thus be as follows:

"Safety Requirements publications establish the requirements that must be met to ensure the protection of people and the environment, both now and in the future. The requirements are governed by the objectives and principles of the Safety Fundamentals. If they are not met, measures must be taken to reach or restore the required level of safety. Their format and style facilitate their use by

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3 This does not currently apply to TS-R-1 (SSR 6)
4 Change as a result of the discussion at the 26th CSS meeting in October 2009
Member States for the establishment, in a harmonized manner, of their national regulatory framework.”

The annex IV of the CSS Sub-group report part A is also slightly updated, particularly for the examples, which were extracted from existing requirements.

The type one requirements described in the annex will be established as overarching requirements expressed in bold and be allocated a discrete number. They should be written in plain language, with clear and short sentences. The requirements on associated conditions to be met described as type two requirements in the annex will be established below the overarching requirements and will be considered as an integral part of the safety requirements. When necessary, explanatory text in support of the safety requirements can be included.

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5 Change as a result of the discussion at the 26th CSS meeting in October 2009
## ANNEX: Detailed definition of the Safety Requirements

<table>
<thead>
<tr>
<th>Types of requirements</th>
<th>Examples</th>
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<tbody>
<tr>
<td><strong>1. Overarching requirements</strong></td>
<td>A regulatory body shall be established.</td>
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<tr>
<td>A requirement to do or not to do something</td>
<td>A program for monitoring individual occupational exposure of workers shall be established.</td>
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<tr>
<td>A requirement to establish a body, a process, a program or to allocate a responsibility</td>
<td>The operating organization shall prepare and implement a programme of maintenance, testing, surveillance and inspection of ...</td>
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<tr>
<td>It indicates who shall do or establish what and, as appropriate, when</td>
<td>The operating organization shall establish and implement a programme to ensure that, in all operational states, doses due to exposure to ionizing radiation in the plant or due to any planned releases of radioactive material from the plant are kept below prescribed limits and as low as reasonably achievable.</td>
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<tr>
<td><strong>2. Conditions associated with the overarching requirements</strong></td>
<td>This program shall be(^6) in place prior to the fuel loading and takes into account operational limits and conditions</td>
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<tr>
<td>Set of requirements on the main features of the process or program to be established</td>
<td>The program for monitoring of the workplace shall specify the quantities to be measured, when and where the measurements are to be made, measurements methods and procedures, reference levels and action to be taken if they are exceeded.</td>
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<td>according to the above category 1 requirement: This includes the scope of the process</td>
<td>Boundaries of controlled areas shall be based on the magnitude of expected normal exposure and the likelihood and magnitude of potential exposure.</td>
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<td>or program in terms of what it shall consider, include or cover, Requirements related</td>
<td>The (radiation protection) program shall covers:</td>
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<td>to the main safety strategy that shall be adopted, Requirements related to the</td>
<td>- classification of areas and access control, including local information on actual dose rates and contamination levels;</td>
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<td>organizational aspects to be considered and, where appropriate the interaction among</td>
<td>- instruments and equipment for monitoring;</td>
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<tr>
<td>different organizations or bodies, and where appropriate steps of the process or</td>
<td>- equipment for personnel protection ...</td>
</tr>
<tr>
<td>program.</td>
<td></td>
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<tr>
<td>This also include Requirements related to the evaluation/assessment of the</td>
<td></td>
</tr>
<tr>
<td>effectiveness and efficiency of the program/processes</td>
<td></td>
</tr>
</tbody>
</table>

\(^6\) Changed as a result of the discussion at the 26\(^{th}\) CSS meeting in October 2009
The program of maintenance, testing … shall include periodic inspections or tests of systems, structures and components important to safety.

In determining the site characteristics that are important to the assessment of the design and safety of near surface disposal facilities, the following shall be considered as a minimum: geology, hydrogeology, geochemistry, tectonic and seismicity, surface processes, meteorology, climate and impact of human activities.

The controlled areas shall be delineated by physical means.

The monitoring of workers occupational exposure shall be based on individual monitoring.

A radiation protection officer shall be designated.

The tasks and responsibilities of different organizational units and persons in outages shall be clearly defined in writing.

The monitoring program shall be regularly assessed.

The program for maintenance, testing, … shall be re-evaluated in the light of experience.