Agenda item 6.1

Findings from the review of the Safety Standards in EPR against the UNSCEAR 2012 Report on Attributing Health Effects to Ionizing Radiation Exposure and Inferring Risks

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Introduction
EPR Safety Standards Review against UNSCEAR 2012 Report

At its 42nd Meeting, CSS requested SSCs:

• To determine which safety standards, currently under development and already published, could be strengthened in respect to:
  – *Retrospective attribution of radiation health effects to radiation exposures*
  – *Prospective inference of health risks from radiation exposures*
  – *Prediction of notional health effects for comparative purposes (e.g. use of collective dose)*

• To report on progress to CSS meetings in 2018
Introduction
EPReSC actions to CSS request

- Reviewed EPR Safety Standards published and under development against the finding of UNSCEAR 2012 Report with support of the Secretariat
  - Findings summarized in a detailed report
- Discussed findings within the EPReSC WG and EPReSC-7 before their conclusion
Introduction

EPR Safety Standards subjected to the review

- EPR Safety Standards subjected to the review:
  
  Published in the period 2011-2018

Currently under revision or development (DS504, DS475, DS469)
Approach adopted for the review

• Due to cross-cutting nature of the areas addressed in EPR Safety Standards relevant to the findings of UNSCEAR 2012 Report, the review was organized in three main areas:
  – Protection strategy for a nuclear or radiological emergency
  – Emergency arrangements at the preparedness stage
  – Communicating radiation risks and radiological health hazards in perspective in EPR

• The review looked into the specifics of how conclusions of UNSCEAR 2012 Report were considered to provide for effective EPR commensurate with associated health risks

• The areas are embedded in the requirements and guidance provided in all EPR Safety Standards irrespective of their format/level and have implications on the way the requirements and the guidance are formulated
Approach adopted for the review (cont’d)

• The area of protection strategy for an emergency deals primarily with:
  – Emergency response criteria that provide basis for taking effective protective actions and other response actions in a nuclear or radiological emergency
  – Approach to ensuring justified and optimized protection at doses that are lower than the internationally agreed criteria

• Associated with Req. 5 of GSR Part 7 (Appendix II) and Req. 44 of GSR Part 3 (Schedule IV) and relevant supplementary guidance
Approach adopted for the review (cont’d)

- The area of emergency arrangements at the preparedness stage deals primarily with:
  - Emergency arrangements that are warranted in the EPR Safety Standards to be made at the preparedness stage to avoid or minimize radiation induced health effects in a nuclear or radiological emergency
- Associated primarily with Req. 8, 9, 14 and 18 of GSR Part 7 and relevant supplementary guidance
Approach adopted for the review (cont’d)

• The area of communicating radiation risks and radiological health hazards in perspective in EPR concerns the way:
  – Radiological health hazards and radiation risks are put in perspective in a nuclear or radiological emergency to support:
    • The effective implementation of the protection strategy
    • Mitigating the non-radiological consequences

• Associated primarily with Req. 13 of GSR Part 7 and relevant supplementary guidance
Findings from the review
Protection strategy for a nuclear or radiological emergency

• Req. 5 of GSR Part 7 and Req. 44 of GSR Part 3 call for development, justification and optimization of protection strategy for taking effectively emergency response actions
  – As part of the protection strategy, generic criteria need to be developed so that once they are exceeded, emergency response actions are taken (either individually or in combination)

• The internationally agreed generic criteria are part of Appendix II of GSR Part 7 (most comprehensive one), Schedule IV of GSR Part 3 and GSG-2
Findings from the review
Protection strategy for a nuclear or radiological emergency (cont’d)

• Generic criteria are grouped in two sets associated with:
  1) Doses received within a short period of time (acute exposures) for which protective actions and other response actions are expected to be undertaken under any circumstances to avoid or minimize severe deterministic effects
    - Associated doses that, based on the UNSCEAR 2012 Report, can result in deterministic health effects in an individual that could be unequivocally attributed to radiation exposure
    - Provide a basis for:
      - Taking precautionary protective actions and other response actions before or shortly after the release or exposures occur, primarily based on observables or plant conditions
      - Identifying the need for medical examination and screening followed, as required, by medical treatment
Findings from the review
Protection strategy for a nuclear or radiological emergency (cont’d)

• Generic criteria are grouped in two sets associated with:
  2) Doses at which protective actions and other response actions need to be taken to reduce the risk of stochastic effects

  ➢ Associated with doses that, based on the UNSCEAR 2012 Report, can result in an increased incidence of stochastic effects in a population that could be attributed to radiation exposure through epidemiological analysis although radiation induced cancers cannot be unequivocally attributed to radiation exposure on an individual basis

  ➢ Provide basis for:
    ➢ Taking urgent and early protective actions and other response actions within the protection strategy either based on observables or plant conditions or based on monitoring results
    ➢ Identifying the need for subjecting individuals for health screening and for longer-term medical follow-up to detect early and, hence, treat effectively specific radiation induced cancers
Findings from the review
Protection strategy for a nuclear or radiological emergency (cont’d)

- GSR Part 7 and GSG-11 address also protection to be provided at doses lower than internationally agreed generic criteria
  - At low doses and low dose rates at which the UNSCEAR Report clearly indicates that deterministic effects and increases in the incidence of health effects in populations cannot be attributed to radiation exposure

- Emphasis put on justification and optimization to ensure that:
  - Actions taken do more good than harm, social and economic factors being considered
  - Protection afforded is the best under the prevailing circumstances (which is not necessarily the option with the lowest dose)

- Attention is drawn on inappropriateness to consider disruptive public protective actions such as evacuation or relocation as implementation of remedial actions, for example, might be more efficient

- No need for subjecting individuals to any medical follow-up in relation to early detection and effective treatment of radiation induced cancers
Findings from the review
Protection strategy for a nuclear or radiological emergency (cont’d)

• Additional considerations:
  ➢ Concept of collective dose is not used for decision-making on public protective actions in a nuclear or radiological emergency within the EPR Safety Standards
  ➢ Protection strategy is implemented safely and effectively in an emergency response through execution of pre-established (at the preparedness stage) emergency arrangements
Protection strategy for a nuclear or radiological emergency (cont’d)

• Protection of emergency workers is addressed separately
  ➢ The concept of guidance values is introduced for providing basis to restrict further exposures when undertaking specific actions
  ➢ Actions to avert large collective dose in this context are associated with those actions aimed at reducing the risk of stochastic effects
    ➢ Taken in case the already discussed second set of generic criteria is exceeded so that doses among affected population will be kept below those that, based on UNSCEAR 2012 Report, could result in increase in the frequency of specific radiation induced cancers through epidemiological studies
      ➢ Does not apply the concept of large collective dose *per se*
Findings from the review

Emergency arrangements

• GSR Part 7 stipulates that the goal of emergency preparedness is “to ensure that an adequate capability is in place [...] at the international level, for an effective response in a nuclear or radiological emergency.”
  – Capability relates to arrangements such as plans, procedures, tools, equipment, supplies, training and exercise programmes, QM programme etc.
  – Capability includes designation of emergency planning zones and distances (for EP Category I and II) and associated arrangements
  • To ensure effective implementation of precautionary, urgent and early protective actions and other response actions even when very limited information is available
Findings from the review
Emergency arrangements (cont’d)

• The four emergency planning zones and distances are:
  – A precautionary action zone (PAZ)
    • Focus is on taking precautionary protective actions to avoid or minimize severe
deterministic effects and associated arrangements
  – An urgent protective planning zone (UPZ)
    • Focus is on taking urgent protective actions to reduce the risk of stochastic effects and
associated arrangements
  – An extended planning distance (EPD)
    • Focus is on taking early protective actions to reduce the risk of stochastic effects and
associated arrangements which include those for conducting timely monitoring and
assessment
  – An ingestion and commodities planning distance (ICPD)
    • Focus is on taking actions for ensuring food and commodities safety and associated
arrangements
Findings from the review
Emergency arrangements (cont’d)

• The level of preparedness for each zone/distance is determined by:
  – Doses that are expected to be incurred by the affected population in absence of any protective action
    • Taking account of the generic criteria already discussed
  – Urgency associated with implementation of effective public protective actions to ensure no radiation induced health effects occur
• The level of preparedness for each zone/distance is required to be detailed for PAZ and UPZ in comparison to EPD and ICPD with priority of the response given to PAZ over UPZ
  – The generic criteria and the findings of UNSCEAR 2012 Report allow implementation of staggered emergency response focusing firstly on those in danger of sustaining deterministic effects and then on those in danger of an increased risk for radiation induced cancers with planning that is more specific and detailed in the same line of priorities
Findings from the review
Emergency arrangements (cont’d)

• More deliberate assessments and informed decisions are foreseen to lead to justified and optimized actions for the rest of affected population (beyond these areas), if needed at all, and arrangements that are more flexible are expected to accomplish this.

• Similar approach is adopted for radiological emergencies with the establishment of inner cordoned off area as required in GSR Part 7.
Findings from the review
Emergency arrangements (cont’d)

• The concepts of hazard assessment as required in Req. 4 and emergency classification as required in Req. 7 of GSR Part 7 also provide for a graded approach both in emergency preparedness and in emergency response
  – Applying similar approach in weighing the level of preparedness needed for specific facilities, activities and sources that may give rise to a nuclear or radiological emergency as well as in weighing the level of response warranted
Findings from the review
Communicating risks and health hazards

- GSR Part 7 requires governments to develop and implement a system for putting radiological health hazards in perspective with the aim to support:
  - Informed decision-making regarding justified protective actions
  - Addressing effectively the primary public concerns regarding potentially harmful health effects

- DS745 provides further guidance and recommendations on the topic
  - Taking into account the UNSCEAR 2012 Report
Findings from the review
Communicating risks and health hazards (cont’d)

• DS475 elaborates a system comprising of three (color-coded) levels that can be used to translate technical data and info into simple language

• Each level is associated with:
  – Health effects that can or cannot be attributed to radiation exposure in line with the UNSCEAR 2012 Report
  – Generic criteria and the need for public protective actions or medical actions
  – Meaning of any risk calculations
Findings from the review
Communicating risks and health hazards (cont’d)

• DS475 also provides guidance on:
  – Use of risk calculations performed for each level in public communication
    • As associated primarily with the inference of radiation risks and prediction of notional health effects
    • Clarifying at what level it is incorrect and unwarranted to make inferences of expectations of numbers of health effects in an affected population from any theoretical risk calculations and to use them in public communication
Conclusions

• Most of the EPR Safety Standards, published or under development, such as GSR Part 7, GSG-2, GSG-11 and DS475 already adequately consider and reflect the conclusions of UNSCEAR 2012 Report
  - At present, the review did not reveal any need for these standards to be strengthened to better address UNSCEAR 2012 Report
  - However, for the next revision of GSG-2 it will be beneficial to:
    • Extend its scope to cover in more details aspects related to the protection strategy and its justification and optimization while explaining how UNSCEAR 2012 Report was considered in line with this Report
    • Explain in details how guidance values for restricting further exposures of emergency workers in the response and associated actions relate to the findings of the UNSCEAR 2012 Report and the international generic criteria
Conclusions (cont’d)

• The revision of GS-G-2.1 (DS504) provides opportunity to strengthen the guidance and recommendations therein for consistency with the latest EPR Safety Standards and the UNSCEAR 2012 Report when providing specific guidance on effective EPR that is commensurate with the associated health risks
  – To be done as part of the on-going revision process in line with SPESS and approved DPP

• The revision of TS-G-1.2 (DS469) addresses an area that is more of a generic nature making use of the concepts already provided in the most up to date EPR Safety Standards with focus on practical arrangements as applicable for transport emergency
  – No implications are foreseen from UNSCEAR 2012 Report warranting further consideration
Thank you!