

Possible impact of updated dose coefficients for intake on revision of IAEA Safety Standards, in particular on GSR Part 3, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards

The position statement prepared by the IAEA Department of Nuclear Safety and Security.

Introduction

International Commission on Radiation Protection (ICRP) Publications with revised or new committed effective dose coefficients for intake (also indicated as dose coefficients in unit [Sv/Bq]) have been or will soon be released. In fact, between 2015 and 2022, dose coefficients for evaluating intakes of radionuclides (via ingestion and inhalation pathways) in the context of occupational exposure have been published, namely, Occupational Intakes of Radionuclides OIR - ICRP Publications 130, 134, 137, 141, 151. To date, the development of dose coefficients for environmental intakes of radionuclides (EIR) for members of the public is ongoing and documents with these updated values are expected to be completed by 2028.

The IAEA Safety Standards frequently reference dose coefficients provided by the ICRP. Specifically, GSR Part 3 includes, in Schedule III, tabulated ICRP dose coefficients for intake from ICRP publications, for example, ICRP Publication 119. Other IAEA publications implicitly reference these dose coefficients, either because they underpin derived quantities such as A_1/A_2 values, D values, exemption, and clearance values, or through direct citation of relevant ICRP publications.

Consequently, it is necessary to consider whether any IAEA safety standards and, in particular, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards GSR Part 3, should be revised soon in light of the new ICRP publications with updated dose coefficients for intake.

Scientific background on ICRP dose coefficients

The updated ICRP dose coefficients consider scientific advancements in biokinetic and dosimetric modelling. They are calculated for more than 1000 radionuclides. Dose coefficients for radon and its progenies are newly available in ICRP Publication 137, based on which updated dose conversion factors (DCFs) in units of mSv per WLM or mSv per Bq h m⁻³ can be derived. Previously, for radon, only dose conversion factors based on epidemiological data were available. It is to be noted that both epidemiological and dosimetric approaches have associated uncertainties.

In radiation protection, the effective dose is used for prospective dose assessment for planning and optimisation in radiological protection, and demonstration of compliance with dose limits for regulatory purposes. Since the effective dose is not directly measurable, its quantification requires mathematical models. These models, in turn, make use of a set of parameters (including dose coefficients) and simplifying assumptions about the characteristics of the exposure scenarios being evaluated. Therefore, due to many factors involved, there is an inherent degree of uncertainty associated with these calculations. **Nevertheless, in the context of radiation protection, dose coefficients are generally considered to have no uncertainty in their defined values and effective dose evaluations are conducted in a manner that ensures that the hazard from exposure is never underestimated, thereby aiming at a protective radiation protection system.**

Implications associated with the consideration of updated dose coefficient in IAEA Safety Standards

While the Agency acknowledges the scientific advancements made by the ICRP in developing new or revised dose coefficients for intake in the Occupational Intakes of Radionuclides (OIR) series and is closely following the progress on determination of updated dose coefficients for the Environmental Intakes of Radionuclides (EIR) series, it will also take into account the significant and extensive work associated with any potential full-fledge revision of its safety standards. Such revision should primarily

be driven by its contribution to the strengthening of radiation safety through the potential future application of revised safety standards.

As such, the impact on strengthening radiation safety by introducing updated dose coefficients in the IAEA Safety Standards Series needs to be evaluated within the context of the purpose and application of the IAEA Safety Standards in Member States and specific evaluation of effective dose.

Conclusion

Given that the ICRP's scientific and review activities for updating dose coefficients are ongoing, **NS deems it premature to make any decisions regarding the potential revision of GSR Part 3 to incorporate the updated dose coefficients prior the completion of work by ICRP on the EIR series.**

Additionally, NS does not perceive any inconsistency in acknowledging that other safety standards under development or those recently published may account for already available new or revised dose coefficients. NS emphasizes that dose coefficients are related to the technical aspect of estimating the effective dose whereas paragraphs 3.26, 3.27 and 3.28 of GSR Part 3 refer to the necessity of ensuring compliance with dose limits and do not mandate the use of the tables available in GSR Part 3, Schedule III. Schedules in Standards, as is the case with annexes, provide additional information that is not integral to the main text.

In the future, IAEA may consider issuing an amendment to GSR Part 3 that refers to an updated set of dose coefficients, without the need of revising its requirements paragraphs.

For the particular case of radon dose conversion factors, the Agency continues to commit to the statement issued by the Inter-Agency Committee on Radiation Safety in 2020 [IACRS Radon Information Overview FINAL - 24_07_2020.pdf \(iacrs-rp.org\)](#), indicating that it is up to national authorities to decide if and when to implement the new ICRP DCF for radon.

The Agency will continue to assist Member States in analysing the possible impacts of updated dose coefficients in their exposure evaluations, e.g., quantification of effective dose, and will assist and support its Member States in the development of approaches to ensure an adequate level of radiation safety for facilities and activities.