

The American Association of Physicists in Medicine (AAPM), which represents more than 6,000 medical physicists throughout the United States and other countries, is a Member of the American Institute of Physics. The AAPM promotes the application of physics to medicine and biology and encourages interest and training in medical physics and related fields. AAPM appreciates the opportunity to offer its views on the draft recommendations of the International Commission on Radiological Protection (ICRP), and we commend the openness and responsiveness of the ICRP in making drafts available for public comment. The most recent draft, posted on the Internet for public comment on June 7, 2006, represents a considerable evolution from the earlier draft on which the AAPM commented in 2004. AAPM looks forward to interacting with the ICRP as these recommendations continue to evolve.

General Comments:

1. In general, the 2006 draft is an improvement over the earlier version of the document, and addresses many of the suggested additions and clarifications. AAPM agrees with the suggestion made at the recent meeting in Rockville, MD that it is essential that the 2006 recommendations contain a section (or perhaps an Annex) that summarizes the changes in recommendations relative to ICRP Publication 60. This summary should consist of both a concise narrative description of the changes, and a table that lists them.
2. AAPM remains skeptical of the need to publish revised ICRP recommendations. In the document and during public presentations, ICRP stated that these recommendations are intended to “consolidate, simplify, and elaborate on the previous set of recommendations published in 1991 as ICRP Publication 60.” However, the current draft does not appear to make a convincing argument that there is a need to make changes in the recommendations since there has not been any significant change in radiation risks, there appears to be no compelling public health and safety argument to make any changes to the recommendations, or to national regulations that implement those recommendations.
3. AAPM recommends that ICRP include a statement in the front of the document that the assumption that the risk of detriment is proportional to dose at low doses is used only to make judgments related to the control of radiation exposures. In addition, ICRP should also include a statement that the risk values quoted and used for radiation protection purposes are not appropriate for determining the risk to individuals or specific populations for specific exposure situations.
4. Concept of Dose Constraint. The ICRP’s attempt to clarify the meaning and use of dose constraint is an improvement over the previous draft, but further clarification is needed. The use of the phrase “provides a fundamental level of protection” clouds the relationship of constraints and dose limits. ICRP should further clarify how constraints function within a radiation protection program and the optimization of protection for a source to ensure that adequate protection for an individual is achieved.

The rewrite of the NCRP 49 Report encountered the problem of whether to use 1 mSv or 0.25 mSv for public protection limits in shielding design of diagnostic radiology facilities. After months of struggle, the NCRP published Statement No. 10, which clarified: *“After a review of the application of the guidance in NCRP (1993) to medical radiation facilities, NCRP has concluded that a suitable source control for shielding individuals in uncontrolled areas in or near medical radiation facilities is an effective dose of 1 mSv in any year. ”*

Yet, many countries (the UK for instance) have adopted 0.3 mSv as a shielding constraint. If the new ICRP keeps this recommendation, many more countries will adopt this value. Since the money available for health care is limited, radiological equipment maintenance and/or replacement as well as staff training are sacrificed in order to comply with regulatory requirements for shielding. The net result is a significant detriment to patient management, especially in developing countries.

The problem may lie in the definition of single source. How can “the x-ray equipment in a hospital” be a single source? What are we going to do for shielding calculations? Take the “geometrical center of all the x-ray units as an “effective point source” or the edge of the closest one to the point of measurement?

Attachment 1 contains a paper titled, “Radiation Protection Standards: Their Evolution From Science To Philosophy” by R. L. Dixon, Joel E. Gray, B. R. Archer and D. J. Simpkin; Radiation Protection Dosimetry (2005), Vol. 115, No. 1–4, pp. 16–22 which elaborates on this point.

5. The ICRP proposes changing the radiation weighting factors, tissue weighting factors, and nominal risk coefficients for cancer and hereditary disease. Of all of the material in the draft recommendations, these changes have the greatest potential for a major impact on regulations promulgated by national authorities. Yet, some of these changes may be premature. The cancer incidence data used by the Biology Working Group is largely based on data published in the early 1990s (Thompson et al., 1994; Preston et al., 1994) using Japanese A-bomb data and the DS86 dosimetry. A new dosimetry system has since been developed, but the “new analyses of the latest A-bomb cancer incidence data are expected soon (Preston et al., in preparation)” [see Annex A, lines 1647–1648]. Promulgating this series of tissue weighting factors and nominal risk coefficients may result in a system of radiological protection that is overly conservative. AAPM believes that recommendations of the ICRP should be based upon published, peer-reviewed scientific information that reflects the current state of knowledge. Thus, AAPM recommends that the ICRP not adopt a new set of tissue weighting factors and nominal risk coefficients until the assessment of the A-bomb data is completed and published in a peer-reviewed journal for public scrutiny.

6. AAPM is concerned about the inclusion of the discussions regarding the termination of pregnancy and believe that they are beyond the scope of the ICRP's mission. Such discussions should be held on case-by-case bases between competent medical practitioners and their patients, and it is therefore inappropriate for the ICRP to propose any numerical value that could be interpreted as the basis for terminating a pregnancy. AAPM recommends that this discussion be deleted from the ICRP recommendations.
7. AAPM is concerned that the ICRP has not clearly explained its rationale for the decision to not recommend gender-specific data for the purposes of radiological protection and how it accounts for gender differences in radiation sensitivity. This difference in radiation sensitivity observed in females has been described in publications of the U.S. National Academy of Sciences in 1990 (BEIR V) and 2005 (BEIR VII) and by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR 2000). AAPM is concerned that without such a statement or basis, regulatory agencies, such as the U.S. Nuclear Regulatory Commission may choose to or be directed to adopt gender-specific data in subsequent revisions to national regulations for radiation protection.
8. In the introduction to the draft recommendations, the ICRP states that Section 10, "Protection of the Environment," describes a policy approach for radiological protection of non-human species. Section 10 does not, in fact, state a policy but only provides a brief description of ongoing work of the ICRP. AAPM recommends that this section be deleted until stakeholders have the opportunity to provide input and comment as the ICRP develops a policy and the framework for assessment.
9. AAPM recommends that a thorough editorial review be performed before publishing the final document. There are numerous instances of incorrect spelling, incorrect usage of terms, references to publications that are not included in the reference lists, text and table numbers that do not agree, and references to documents that are yet to be drafted, being drafted, under review, or in press. In addition, there were many comments made during the public meeting in Rockville, MD that indicate the intent of the ICRP may not be exactly as stated by the printed draft text. All referenced material should be publicly available at the time of publication or reference to that material should be deleted.

Specific Comments:

1. Paragraph 89. The term, "equivalent dose" was going to be replaced by "radiation weighted dose", which solved two problems: the confusion in English speakers remembering when to use equivalent dose and when effective dose, and the problem for Spanish speakers, for whom both equivalent dose and effective dose translated to the same term. It would be good to make the change in terminology.

2. Chapter 7 – Much of the chapter on natural sources seems unnecessary. A simple distinction making man-made accumulation of radioactive materials no longer natural would place it under the previous chapters.
3. Relating to the radon issue, the report seems to misrepresent the conclusions of Lubin et al. 2004, and ignore the comments of Heidi et al, 2006 (Heid IM, Kuchenhoff H, Rosario AS, Kreienbrock L, Wichmann HE. Impact of measurement error in exposures in German radon studies. J Toxicol Environ Health A. 2006;69:701-21) on the sensitivity of the studies to the poorly defined variables. Also missing was any reference to the significant work by Bernard Cohen.
4. Paragraph 317. The Commission asserts that the simplest way of dealing with potential exposure is through probability of radiation-related death rather than effective dose. That seems inconsistent with considering potential exposure on the par with actual exposure. If potential exposure is seen in the context of death, than a simple prevention approach is the only that makes sense. Only if the potential exposure can be seen in a context of effective dose does its inclusion in this framework form coherence.
5. Paragraph 361. Most of the discussion in 11.1 assumes a Western, European style culture, particularly regarding public input into regulations. The tone might be modified to be less alienating to societies where the policy making is less open.

Minor Comments:

1. Paragraph 37, delete single parenthesis in after “situations”.
2. Paragraph 49, line18, rewrite the paragraph to remove the conglomeration of four prepositions together.