



Statement on Proposed Changes to Australia's Radiation Protection Standards (January 2010)

Australia's Radiation Protection Standards, are currently embodied in ARPANSA's Radiation Protection Series publication 1 (RPS 1), *Recommendations for Limiting Exposure to Ionizing Radiation and National Standard for Limiting Occupational Exposure to Ionizing Radiation (2002)*¹. RPS 1 is based on the 1990 recommendations of the International Commission on Radiological Protection (ICRP) in its publication 60 (1991)².

In December 2007, ICRP published new recommendations³ (ICRP publication 103), and as a result, the Radiation Health Committee (RHC) has commenced a process of reviewing the ICRP's recommendations and revising RPS 1.

The ICRP decided to revise its 1990 recommendations having three primary aims in mind:

- to take account of new biological and physical information and of trends in the setting of radiation safety standards
- to improve and streamline the presentation of the recommendations
- to maintain as much stability in the recommendations as is consistent with the new scientific information.

The key changes to ICRP's recommendations include:

- conceptual changes to the system of protection, so that the system applies to all exposures from any source, but can apply in their entirety only to exposures or pathways that can be controlled by some reasonable means. Three types of exposure situations are recognised: planned exposures, existing exposures and emergency exposures. The recommendations also distinguish between three categories of exposure; occupational exposure, public exposure and medical exposure;
- to increase the emphasis on optimisation and a system of dose constraints and reference levels as the primary means of ensuring protection; and
- changes to the radiation weighting factors and tissue weighting factors.

The occupational and public dose limits in ICRP 103 have not changed.

¹ ARPANSA, *Recommendations for Limiting Exposure to Ionizing Radiation (1995) and National Standard for Limiting Occupational Exposure to Ionizing Radiation* [NOHSC:1013(1995)] (Republished March 2002)

² ICRP, *1990 Recommendations of the International Commission on Radiological Protection*, ICRP Publication 60, Annals of the ICRP, Vol 21, No 1-3 (1991)

³ ICRP, *The 2007 Recommendations of the International Commission on Radiological Protection*, ICRP publication 103, Annals of the ICRP Vol 37, No 2-4 (2007)

The RHC review will involve rewriting RPS 1 to take account of the ICRP recommendations and other international developments such as the IAEA's revision of the International Basic Safety Standards⁴.

A consultant has been appointed to prepare a draft in conjunction with a steering group of RHC members. A broader Consultative Group has also been appointed to participate in the development process of a new RPS 1. There will be a public consultation process when the RHC has approved the draft, and all changes to RPS 1 that could have an economic or social impact will be examined in a regulatory impact statement, which will also be released for consultation. This process will take some time to complete, but the time scale is acceptable given that the dose limits have not changed and that optimisation to keep doses as low as reasonably achievable, is already part of the system of radiation protection in Australia.

One aspect of the changes to ICRP recommendations that may require earlier attention by some radiation users is the change to the radiation and tissue weighting factors. The new factors are published in Tables 2 and 3 of ICRP 103 and are reproduced below.

The changes to the radiation weighting factors from those in ICRP 60 are that neutrons have been made a continuous function of energy, the proton weighting factor has changed from 5 to 2 and pions have been included with weighting factor 2.

Table 2. Recommended radiation weighting factors

Radiation type	Radiation weighting factor, w_R
Photons	1
Electrons ^a and muons	1
Protons and charged pions	2
Alpha particles, fission fragments, heavy ions	20
Neutrons	A continuous function of neutron energy (see ICRP 103, Fig. 1 and Eq. 4.3)

All values relate to the radiation incident on the body or, for internal radiation sources, emitted from the incorporated radionuclide(s).

^a Note the special issue of Auger electrons discussed in paragraph 116 and in Section B.3.3 of Annex B.

⁴ IAEA, *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources*, Safety Series 115 (1996)

The changes to the tissue weighting factors from those in ICRP 60 are that gonads changed from 0.2 to 0.08, breast changed from 0.05 to 0.12, bladder, liver, oesophagus and thyroid changed from 0.05 to 0.04, brain (previously included in remainder tissues) and salivary gland (not previously specified) are listed as 0.01, and remainder tissues changed from 0.05 to 0.12.

Table 3. Recommended tissue weighting factors

Tissue	w_T	Σw_T
Bone-marrow (red), Colon, Lung, Stomach, Breast, Remainder tissues*	0.12	0.72
Gonads	0.08	0.08
Bladder, Oesophagus, Liver, Thyroid	0.04	0.16
Bone surface, Brain, Salivary glands, Skin	0.01	0.04
	Total	1.00

* Remainder tissues: Adrenals, Extrathoracic (ET) region, Gall bladder, Heart, Kidneys, Lymphatic nodes, Muscle, Oral mucosa, Pancreas, Prostate (♂), Small intestine, Spleen, Thymus, Uterus/cervix (♀)

The RHC recommends that relevant radiation users note that the changed weighting factors will be included in the revision of RPS 1, familiarise themselves with the details, and consider any implications arising from implementing them.

The Radiation Health Committee recommends that where practicable, radiation users commence using the new weighting factors now. However, they are not yet part of RPS 1 and where there are implementation issues with a significant economic or other impact, implementation could be delayed until the adoption of the revised RPS 1. The RHC would appreciate being informed of implementation issues and impacts from the new weighting factors. This can be done by emailing the Committee secretariat at secretariat@arpansa.gov.au.