Masato IDA
Early retired from: J-PARC Center, Japan Atomic Energy Agency

On the word "prudent"

The word "prudent" has many different meanings, and there are significant misunderstandings on it. A concise explanation of the true meaning of the word should be presented in the Draft.

I imagine that the ICRP members use the word "prudent" instead of "foresightful".

On the phrase "the order of"

The phrase "the order of" has many different meanings, and should be replaced with clearer words. For instance, I recommend to replace "levels on the order of 1 mSv per year" with "1 mSv/y or less".

On the concepts of "reference levels" and "optimisation"

In my opinion, the concepts of "reference levels" and "optimisation" are too much complicated and hence it is very difficult to apply them to realistic situations such as the Fukushima accident. These need a large amount of manpower and many trained experts to realize.

In fact, in Japan, the criterion for relocation is still fixed at 20 mSv per year and the optimisation process has not yet been performed for over 8 years!!

A simpler protection strategy is now desired.

On Paragraph (g)

In this paragraph, it is stressed that economic, societal, and environmental factors have to be taken into account in the optimisation process. However, only a very small part is given to explain the importance of economic factors. Monetary compensation is one of the essential economic factors, and is known to strongly influence the protective actions.

Add a comment to explain the importance of continuous compensation to maintain protective actions, particularly for evacuees.

On Paragraph (22)

As known well, the cancer detriment used in this paragraph, approximately 0.5% per 100 mSv, is an Averaged Value, given by averaging over age and gender. This value is useless in real nuclear accidents where affected people concern about their related individuals (e.g., children, family, themselves), but not about an average person.

Also, the direct application of this value (0.5%) to children is known to cause a significant underestimation of cancer risk.

I strongly recommend to present age-and-gender-dependent detriments in a Table. Age-and-gender-dependent detriments (or cancer risks) are introduced in, e.g., BEIR VII and Annex C of ICRP Publication 60.

On Fig. 2.3

Add a comment to explain that the individual doses in this figure are projected doses, but not the doses that the individuals have already exposed.

On Paragraph (80)

The meaning of the statement "would not generally need to exceed 10 mSv per year" is very unclear. When and who would not need to exceed 10 mSv/y? What is the underlying reason of this statement? Do you mean "the reference level must not exceed 10 mSv/y in any situation"?

On Paragraph (102)

In this paragraph, the importance of thyroid dose monitoring for children and pregnant women is stressed. This is a significant advancement of the ICRP publication. In Publications 109 and 111, now being updated, thyroid dose monitoring was not mentioned even though these were published in 2009, long after the Chernobyl accident where thyroid dose monitoring played significant roles.

What was the trigger of this modification? Was the failure of thyroid dose monitoring in Fukushima?

On Paragraph (119)

It is stated that "At doses higher than 100 mSv, there is ... a statistically significant risk of cancer". This statement is clearly out of date. Now many journal papers exist that reported a statistically significant risk of cancer at cumulative doses lower than 100 mSv. See, e.g.,

[*] Grant *et al*., Solid cancer incidence among the life span study of atomic bomb survivors: 1958-2009, Radiation Research **187**, 513 (2017).
[*] Kendall *et al*., A record-based case-control study of natural background radiation and the incidence of childhood leukaemia and other cancers in Great Britain during 1980-2006, Leukemia **27**, 3 (2013).
[*] Spycher *et al*., Background Ionizing Radiation and the risk of childhood cancer: a census-based nationwide cohort study, Environmental Health Perspectives **123**, 622 (2015).
[*] Nikkilä *et al*., Background radiation and childhood leukemia: A nationwide register-based case-control study, International Journal of Cancer **139**, 1975 (2016).
[*] Noshchenko *et al*., Radiation-induced leukemia among children aged 0-5 years at the

time of the Chernobyl accident, International Journal of Cancer **127**, 412 (2010).
[*] Richardson *et al*., Risk of cancer from occupational exposure to ionising radiation: retrospective cohort study of workers in France, the United Kingdom, and the United States (INWORKS), BMJ **351**:h5359 (2015).
[*] Haylock *et al*., Cancer mortality and incidence following external occupational radiation exposure: an update of the 3rd analysis of the UK national registry for radiation workers, British Journal of Cancer **119**, 631 (2018).
[*] Veiga *et al*., Thyroid cancer after childhood exposure to external radiation: an updated pooled analysis of 12 studies, Radiation Research **185**, 473 (2016).
[*] Lubin *et al*., Thyroid cancer following childhood low-dose radiation exposure: a pooled analysis of nine cohorts, Journal of Clinical Endocrinology & Metabolism **102**, 2575 (2017).
[*] Little *et al*., Leukaemia and myeloid malignancy among people exposed to low doses (< 100 mSv) of ionising radiation during childhood: a pooled analysis of nine historical cohort studies, The Lancet Haematology **5**, E346 (2018).

Some of the above papers are written by Prof. Richard Wakeford, an ICRP member.

On Table 6.1

I strongly recommend to use "0-100 mSv" and "0-10 mSv per year" instead of "< 100 mSv" and "< 10 mSv per year," respectively, for Public. These modifications of expressions clarify the purpose of eliminating the lower limits.

The phrase "the order of 1mSv per year" should be replaced with "1 mSv per year or less."

Add a comment on the upper limit of the total exposure during an accident assumed in the Draft, which might be a cumulative dose of 100 mSv for Public cases.

"Section 2.3.3.3" shown in a remark of Table 6.1 should read "Section 2.3.3".

On Paragraph (B 42)

The descriptions in paragraph (B 42) are too much rough; even necessary references are not cited. Be more careful in writing this paragraph.

How did you judge that "Childhood thyroid cancer cases found in Fukushima Prefecture are unlikely to be the result of radiation exposure"? What is the source of this information?