Comments on the ICRP Draft Document for Consultation:
Ethical Foundations of the System of Radiological Protection

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Dear Colleagues,

We commend the authors of the International Commission on Radiological Protection (ICRP) Draft Document on the Ethical Foundations of the System of Radiological Protection for their thorough compilation of the history and evolution of our current system of radiological protection, and its relationship with the most important principles of ethics. The current document is very impressive and provides a thorough explanation of the ethical basis and considerations for our community's decisions and actions with respect to radiological protection. The document is timely and well in line with the explicit and implicit expectations by policy makers and the general public for a system of protection from ionizing radiation.

We have identified a few general and some specific thoughts or comments on the draft document which we would like to share with the Commission.

General

Over the past few decades, the ICRP undeniably and deservedly have accumulated an unchallenged reputation in producing the scientific basis for radiation protection standards by converting scientific knowledge and findings (e.g., from UNSCEAR, other scientific bodies, and the published literature) into an applicable and consistent system of radiation protection for implementation in the practical operational realm. This system is widely accepted throughout the world and serves as a basis for regulators and operators alike. We are somewhat concerned, however, that the full intention of this document might not be immediately obvious to all readers. It could be perceived as rather a foreign object within the document series of the ICRP, rather than explanatory material supporting the other documents / recommendations by the Commission.

The current document clearly exceeds the previous work of the Commission by extending the scientific foundation of radiation protection to include philosophical considerations. In that, we appreciate the readability and clarity of the text, which was a pleasure to read. At the same time, we would like to caution the authors to avoid the appearance of simple self-praise due to a reliance on the retrospective justification of the work of the Commission, rather than the development of a progressive philosophical framework for future work in the field. We believe it would be a disservice to the great work of the Commission if the readers received the impression that scientific development in radiation protection has reached an equilibrium or saturation if the Commission solely relied on searching the past in a historical document instead of promoting further and future development in a strategic document. One way to establish this strategic component might be to provide first ideas on establishing a sustainable link between radiation protection and ethics in order to ensure a common basis in communication and understanding of our field for the future.

We were intrigued by the framework and the content of this ICRP draft document. It is indeed encouraging to see that our system of radiological protection, and the decisions and value judgements we have made in the past and are making on a daily basis, can be traced to sound ethical principles.

As the authors point out, however, those ethical principles do not always provide clear guidance on the actual implementation of radiological protection and its operational execution. In reflecting on Paragraph (14), Lines 504-513, we realized a question, a question which concerns not only the three fundamental principles of radiological protection, but also our current understanding of the procedural value of stakeholder involvement and "informed consent." Do the authors have an opinion on the suitably ethical process of the use of a radiological source (e.g., nuclear power plant) which can be and is justified in one location, but has a potential impact in another locations, where that use is neither justified nor optimization has taken place? How would such a situation affect the ethical foundation of our system of radiological protection, or would it make a difference at all in the discussion at hand?

We are very interested in continuing the thought process of Paragraph (31), Lines 644-650, on the ethics of emergency and existing exposure situations. While we agree with the Commission's earlier recommendations regarding reference levels in those situations, it sometimes becomes difficult to explain to all our stakeholders that some exposure situations might result in "significantly higher exposure levels compared to those prevailing with planned sources." We simply might have failed to be sufficiently transparent in our discussions on this issue, as it appears as if we suddenly allowed for higher dose (risk, according to LNT) to the individual. Is there an ethical basis for us to accept that higher level of risk, other than the high cost (to individuals and society) of remediation to "normal background," and plausibly explain to the general public?

We are a little concerned that while the authors have provided an interesting and exemplary Annex C on cross-cultural values, the draft document might still be viewed as heavily biased towards western cultural norms and moral values. Even in this annex, while other cultural ethical thoughts are introduced, the basic tenets of the system of radiological protection are explained in terms of our western values, and other cultural ethics are tied to ours, explaining the system of radiological protection maybe only indirectly in terms of other cultural values. We enjoyed reading this annex, but wanted to motivate a brief reflection on ensuring it will not be perceived to be patronizing in the end.

The inclusion of Annex C seems to suggest that a deductive approach is envisaged for this document by the Commission. We feel it might be a little too soon for this approach as the terminology might not be familiar to the readers yet, and Annex C raises a set of issues in the international cultural component of this discussion. Instead, an inductive approach regarding the "western" way of life and, when clearly developed, extended to other cultures might be more promising. Clear definitions, a still more extensive glossary, and broadly accepted and harmonized terminology, not just for the terminology used in the current draft document, but for the terminology used by the Commission in general, are sorely needed and should take priority in the Commission's future work program. We have provided several examples in the section titled "Specific" below, but are mainly thinking about terms like "radiation risk", "harm", etc.; please ensure that the terms "radiation risk", "harm" (Line 330), and "risk" (Line 779) are used consistently throughout the document.

<u>Specific</u>

Line 112: We appreciate the Commission's intent to provide this document for a large audience, an audience including such diverse stakeholder as, for example, "regulators". However, it is not immediately obvious how the current document will benefit regulators in their work, as it does not provide content which can be translated readily into legislative documents. Maybe the authors could elaborate on the document's benefit to the various stakeholders.

Line 247: The sentence containing the statement "[…] seeking to reduce uncertainties in the understanding of radiation risk" might allow for misinterpretation if taken literally, as the "understanding" of radiation risk would not have an associated uncertainty (in the statistical definition of that term).

Line 301: If the term "distribution" is understood in its mathematical sense, the notion of a "fair distribution" might be difficult to interpret; maybe the authors could revise the sentence avoiding this potential ambiguity.

Line 338: The definition of the "precautionary principle" is difficult to read; it might be missing some words or punctuation.

Line 351 (and Annex C): We, as the community of radiation protection professionals and scientists, have not reached universal agreement on the term "risk", and the Commission has not yet provided a clear and unique definition. It might be rather difficult for us to explain this term to persons from very different backgrounds under these conditions.

Line 492: This sentence references Figure 2, and the Figure below paragraph (13) is also labelled Fig. 2. However, Figure 1 appears to be missing.

Line 525: Please note radiation protection efforts were already in place in various countries by the time of the foundation of the ICRP, and some ethical basis most likely would have been used for radiation protection decisions at that time already as well (see, for example, Tschurlovits and Karacson 1986).

Line 592: The sentence in the middle of the line starts with "[n]early three decades had passed since the discovery […]" However, provided the years of publication of the following references, it appears that "more" than or "thirty years" had passed. "Nearly" should probably be deleted.

Line 567: The authors might consider changing the sentence to "[…] exposed to fallout from <u>a</u> US <u>nuclear weapons</u> test in 1954."

Section 2.3, Paragraph (28), Line 621: We realize that this is an important paragraph regarding the ethics of the protection of the environment. However, the three different examples of approaches towards that ethic "(i.e., anthropocentric, biocentric and ecocentric approaches)" might not be familiar to all readers. They have not been defined in the Glossary, and they are not elaborated upon further in the text. In this current frame, they do not add to the paragraph, but instead might be confusing. The authors might consider their deletion, or a brief explanation of their meaning and / or differences.

Line 642: The sentence should probably read, "[…] account of the degree <u>of</u> controllability of sources […]"

Lines 657-658: Editorial suggestion: the authors might consider "[…] of post-accident situation in order for individuals to make informed decisions ~~in order~~ to improve the radiological situation […]".

Lines 691-693: The bullet on the principle of limitation is difficult to read and / or interpret. In particular, the last clause "[…] to planned exposure situations other than medical exposure to patients or exposure to biota" could be interpreted in several different ways. The authors might consider a slight revision, or additional punctuation.

Line 754: The sentence should probably read, "[…] it is recommended that <u>the</u> evaluation of consequences […]"

Line 868: The sentence should probably read, "[…] equal treatment for all with regards <u>to</u> higher levels of exposure."

Line 913: The sentence appears to be missing punctuation; it should probably read, "[…] to security screening in airports (ICRP, 2014b), to radon in their homes […]"

Line 947: The sentence should probably read, "[…] gradually led to the recognition that quantification alone […]"

Line 1046: The sentence should probably read, "[…] comprehends the disclosure, acts voluntarily, and consents […]"

Lines 1086-1087: The sentence should probably read, "[…] management of exposures in areas contaminated by the Chernobyl accident and sites contaminated by past nuclear activities in the United States […]"

Lines 1147-1148: The sentence should probably read, "[…] by reducing existing exposures or introducing ~~a~~ new radiation sources […]"

Line 1181: Did the authors mean to say, "[…] is a permanent quest which depends […]?" There might also be other options for a slight revision of this sentence, but "questioning" might not be the correct word in this context.

Line 1269: The sentence appears to be missing punctuation; it should probably read, "[…] consequentialism is utilitarianism, and the representatives […]"

Line 1345: The sentence should probably read, "[…] was generated at ~~the~~ Georgetown University […]"

Annex C.3, Paragraphs (C23)-(C27), Lines 1545-1566: The authors provide an excellent discussion of different Confucian ethical thoughts, and how those relate to the current system of radiological protection. They list and explain several of those moral values. Is there a particular reason why "Xin" (trust) was not assigned a paragraph like the others?

Conclusions

We appreciate the efforts of the Commission to explain the ethical foundation and framework for the current system of radiological protection. We feel this is an important endeavor, both for the science and in demonstrating the radiological protection community's commitment to providing a service and protection to humankind and the environment.

As a final observation, we note that ethics and radiological protection might be using two very different types of language. Radiation protection is based in the natural sciences, with very specific requirements and customs with respect to scientific communication. For example, a quantity has to consist of a magnitude (numerical value) and a reference (unit), and it has to be defined unambiguously. In addition, a quantity has particular properties such as that it is deterministic or stochastic, etc. (e.g., dose, risk). Ethics, on the other hand, is a part of philosophy ("ethics or moral philosophy is a branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong conduct" – Encyclopedia 2017), and the terms used for communication in this field are not necessarily consistent with terms used in the natural sciences. For example, instead through the use of a magnitude and reference, quantities are explained by proper wording. We are concerned that communication between the fields of ethics and radiological protection without an explicit agreement on a common language may lead to mis-communication, rather than achieving the intended objective. We encourage the authors to consider this in their final revision of the document.

References

Fieser, J., Dowden, B. (Ed.) Internet Encyclopedia of Philosophy. http://www.iep.utm.edu/; last accessed 18 July 2017.

Tschurlovits, M., Karacson, P. Licensing of Medical X-ray Equipment in 1899: Background and Procedure. Int. J. Rad. Appl. Instrum. A 37(5):373-81; 1986.