EGIR Review of Draft ICRP Recommendation:
Radiological Protection Against Radon Exposure

Introduction

The Expert Group on the Implications of Recommendations (EGIR) held its first meeting in September 2002. The Group was created by the CRPPH to perform assessments of draft ICRP general recommendations and to provide policy and implementational feedback to the document drafters with the aim of ensuring that the final recommendations addressed the views and concerns from CRPPH. Four separate EGIR meetings were held to assess various ICRP draft general recommendations documents, and the results of Committee's activities with the ICRP regarding the new general recommendations (ICRP Publication 103) are documented in a CRPPH report titled: "The NEA Contribution to the Evolution of the International System of Radiological Protection" (NEA 2009).

This draft document assessment process is seen by the CRPPH as having been very successful in two key aspects. First, it has allowed the CRPPH to make its views and concerns clear to the ICRP on particular documents and subjects of interest. Second, it has helped the ICRP to clearly collect and address relevant views on its draft recommendations, such that final texts may be more broadly understood, accepted and used.

In 2008 the CRPPH agreed that the EGIR assessment process should also be applied to Rev. 1.0 of the new International Basic Safety Standards. This was the first "non-ICRP" document assessed using this approach, but again the results were very much appreciated by the CRPPH and by the IAEA who is principally responsible for the drafting of this internationally co-sponsored document[1].

Because of this positive experience, the CRPPH agreed at its 2009 meeting that the EGIR process is a powerful and useful assessment tool that could, in principle, be used to assess draft documents from many different organizations, providing, of course, that the CRPPH was interested in a particular document in development, and the drafting organisation was willing to provide draft material for assessment. As such, the CRPPH agreed that the EGIR should be thought of as a process "in standby", to be implemented on an ad-hoc basis to assess specific draft documents identified by the CRPPH. Each such assessment will involve a new call for nominations to assure the participation of appropriate subject-matter experts.

[1] It should be noted that revisions 2.0, 3.0, 4.0 and 5.0 of the BSS were also reviewed by the EGIR in this fashion, resulting in many of the CRPPH concerns being addressed in the 2011 version of the BSS that was approved by the IAEA Board of Governors in September 2011.

The ICRP recommendation, Radiological Protection Against Radon Exposure, was identified by the CRPPH as being a document of great interest. As such, the call for nominations resulted in experts from the CRPPH being named to the Expert Group for this EGIR review process. Annex 1 contains a list of the EGIR membership for the review of this document.

As with other EGIR reviews, the process involved a word-by-word, line-by-line, page-by-page review of the document, noting questions, identifying areas needing clarification, and providing suggestions for changes to the text. Each question, clarification request and suggested change is accompanied by a clear rationale as to why the Expert Group feels the comment is necessary. As a result, the meeting produced a list of general comments, as well as an annotated version of the document including all comments and suggestions. The Expert Group's final report will be sent directly to the ICRP, as well as to the full membership o the CRPPH for their information.

General Comments

As a result of its detailed review of the draft document, the Expert Group agreed on a series of general comments, in addition to the specific suggested changes. General comments are presented here, and specific comments are presented directly in an annotated version of the draft document shown in "track-change mode".

Document Overview

The Group agreed that this is an important document, in particular presenting the application of the Commission's planned and existing exposure situations to protection against radon exposures. This presentation was seen as broadly consistent, but it was felt that further editing is necessary for the Commission's message to be completely coherent throughout the document. The document is also in need of some language editing to enhance clarity.

Consistency with the BSS

The Group recognised that the issues regarding protection against radon exposure have been quickly evolving. It was noted that this report is intended to supplement the ICRP Porto statement on radon, and that this work had developed in parallel with the development of the International BSS and the European Commission's BSS Directive. However, it was noted that this report makes recommendations that have some significant differences from the International and EC BSS documents, and as such there is some concern that the document should be consistent with the International and EC BSS documents.

Dose Coefficient

The Group noted that final dose coefficient to convert from concentration of Radon-222, in Bq/m^3, to ~~exposure~~dose, in mSv/a, is currently under discussion. This issue is extremely important for developing protection approaches and criteria, particularly for mixed exposure situations (e.g. exposure to radon-222 and external gammas). The current understanding of the relationship between radon concentration and annual exposure, including a clear expression of how smoking is accounted for in determining the dose coefficient, should be clearly expressed in the document.

Thoron

The document addresses protection against radon exposure, but focuses mostly on exposure to radon-222. While the Group recognised that exposures to radon-220 are generally of less radiological concern, it was highlighted that radon-220 exposures may occur as a result of building materials. As such, the Group felt that the document should better present the protection concerns with respect to t~~T~~horon, focusing on building materials. The document should also be more clear, in paragraph 7 for example, on how it's focus is more on radon-222 than on radon-220.

Protection in Existing and Planned Situations

The Group felt that the document's discussion of protection against radon exposure at work was a centrally important part of this document, but was not clearly presented. The Commission's recommendation as to whether radon should be always addressed as an existing exposure situation (with some exposures at work using occupational exposure protection aspects of planned exposure situations), or whether some work exposures (e.g. uranium mines, NORM

industry, etc.) were in fact planned exposure situations, was not clear from the draft text. The protection aspects that would be recommended for exposure at work that should be treated as occupational exposure are also not clearly presented. This lead the Group to the following general comments:

- The transition between consideration of the exposure situation as existing, and considering the exposure situation as planned should be expressed more clearly
- The document focuses mostly on existing situations. The few cases where radon should be considered as an occupational exposure should be more carefully presented.
- The ICRP should consider that the treatment of radon exposure as occupational exposure should be based on a list of industries and activities, developed by the relevant national authority, that has been formulated primarily ~~on~~ using qualitative or quantitative criteria for when and ~~used to develop a list of activities, established by the government,~~ where radon exposure at work should be addressed as occupational exposure.
- The document should make it absolutely clear the employer is responsible for providing a safe work environment with regard to radon, regardless of wherever the radon exposure is considered as an occupational exposure or not.

Comment [TL1]: Addition from David Pollard

Reference Level

The document suggests the use of Reference Levels for the management of exposure to radon, but is not fully clear on whether a ~~dosimetric~~ dose or concentration ~~level~~ value should be used for this criterion. The expression of the Reference Level as either mSv/a or as Bq/m^3 should be clarified. The Group suggests that, f~~r~~or radon protection, consideration could be given to using reference levels that are expressed primarily in terms of indoor environmental concentration, since this is how most radon protection is applied in practice, and since there remains considerable uncertainty regarding the dose coefficient (see above)~~to express reference levels~~.

There is in some circumstances, however, a need to use dose criteria to manage occupational exposures to radon. Again, the current level of uncertainty in the dose coefficient causes some operational difficulties. The document should address how the ICRP proposes to resolve this issue.

It is also not clear from the text whether the recommended reference level applies to radon-222, to radon-220 or to the total of both. This should be specified.

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Comment [TL2]: David Pollard also agrees to add this

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~~Question to the EGIR: We noted that there was some confusion in the document regarding whether, in specific instances it was referring to radon-222 or to radon-220 or to both. Here, if you agree, I would suggest that we could add the following sentence to the end of general comment above:~~

Comment [t3]: I agree on including the comment

~~**It is also not clear from the text whether the recommended reference level applies to radon-222, to radon-220 or to the total of both. This should be specified.**~~

Comment [TL4]: David Pollard also agrees to add this

Protection of Children

The Group felt that one of the key concerns of a general population exposed to radon could be the protection of children, but that the document did not sufficiently address this. ~~Given that there is epidemiological evidence (not yet confirmed) of a link between radon exposure and childhood leukaemia,~~ T~~t~~he Group ~~thus~~ suggests that the ICRP should consider whether children should be particularly protected, and if so, protection of children through the proposed approach should be explicitly presented.

Optimisation

The Group noted that Publication 101 presents, and gives examples, of optimisation as a broad process including many different considerations and criteria, and suggested that optimisation of protection against radon exposures would certainly consider many dimensions of the given circumstances. As such, the Group felt that the optimisation of protection should be more explicitly expressed as multi-criteria, as in Publication 101.

Focus of Protection

The Group suggested that the while ~~the~~ radon protection ~~against radon exposures~~ aims to reduce individual exposures, this is generally achieved not on the basis of controlling exposure to specific ~~on an~~ individuals ~~basis~~ but rather by focusing on reducing radon concentrations in buildings as an indicator of exposure to notional individuals using the building. As such, the Group felt that the focus of protection, to address buildings in order to protect all individuals using them, should be more explicit throughout the document.

Responsibility

The responsibility for protection is an important aspect that is addressed in the document, but such responsibilities may be quite different and quite complicated for different situations (e.g. for home owners, for renters, for employers in shops or schools, etc.). The document attempts to describe these responsibilities for radon protection, but this is difficult for many types of buildings, particularly if this refers to legal responsibility. As such, the Group feels that the focus of the document should be on protection of anyone using a building~~individuals~~, through focus on measures to reduce concentrations in buildings, and should not discuss legal responsibilities.

Radon-prone Areas

"Radon prone areas" are referred to in the text in several paragraphs (e.g. paragraphs 145 – 147)~~, but that there is no definition of such areas in the glossary~~. The Group ~~noted~~ suggested that a single paragraph should be added, near the beginning of the document (perhaps moving the paragraphs mentioned), describing why such areas are important to the recommendations in the document and how such areas, once defined, should be used~~, would be useful~~. The use of

Comment [t5]: Radon-prone areas are actually defined in the glossary (lines 490-493)

geologic aspects in identifying such areas could also be mentioned, perhaps in the glossary definition.

Glossary

The Group noted that ~~many~~ some of the terms defined in the glossary did not match those provided for the same terms in Publication 103. As such, the Group suggested that the ICRP should review the definitions in the glossary so as to be consistent with those in Publication 103 and applicable to this document or have concrete reasons for changing. One key example where change might be appropriate would be to broaden the definition of a "reference level" to include RL's in terms of activity concentration as is proposed in the body text for radon.

Medical Exposure to Radon

The Group noted that this document suggests that deliberate radon exposure in spas for "prescribed medical treatment" is considered as a medical exposure (see paragraph 70). The Group felt strongly that the ICRP should carefully examine this statement to ensure it is consistent with the view of the ICRP group(s) that consider medical exposures.

Uranium and NORM Industries

The Group noted that the uranium industry has been addressed as part of the fuel cycle and as such has ~~-~~been widely treated by regulatory authorities as a planned exposure situation, including exposures to radon. Many NORM industries are also treated by regulatory authorities as planned exposure situations. As such, the Group noted that uranium and NORM industries should be considered in a similar manner, and that regulatory authorities should clearly express their rationale for addressing the uranium and NORM industries ~~should be managed~~ as either planned or existing exposure situations.

High Radon Exposures

The Group noted that in many countries some buildings have very high radon concentrations (far in excess of 10 000 Bq/m^3) that could result in very high annual exposures, certainly much more than 100 mSv.~~high radon areas result in annual exposures of over 100 mSv/a often arise, and as s~~Such situations merit being explicitly addressed in national approaches to protection against radon exposures. Because of this, the Group felt that the document should recommend that, should such high radon exposures (for example, over 100 mSv per year) exist in a country, they should be explicitly addressed in national radon action plans. This would be consistent with the ICRP views on such high exposures as described in Publication 103, and would be consistent with adopting graded approaches to radon protection.

Comment [t6]: The way it was written, it gave the impression that exposures over 100 mSv/y could only arise in radon-prone areas. But dwellings with very high radon levels may be found everywhere, not only within radon-prone areas.

Executive Summary and Main Points

Many of these issues will apply to the executive summary and main points, and should be thus reflected in the subsequent editing of those sections.

Annex 1
EGIR Membership for the Review of
Radiological Protection Against Radon Exposure

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