Assessing Dose of the Representative Individual
for the Purpose of Radiation Protection of The Public
Task Group Report of Committee 4

The U.S. Nuclear Regulatory Commission (NRC) would like to thank the International Commission on Radiological Protection (ICRP) for the opportunity to provide comments on the draft Foundation Document "Assessing Dose of the Representative Individual for the Purpose of Radiation Protection of The Public". The opportunity to submit and review other stakeholder comments on Commission documents is greatly appreciated.

General Comments:

1. This Foundation Document offers useful concepts and material. However, the presentation suffers from repetition, and slightly different formulations for the same concept, leading to confusion. Significant improvement can be achieved by removing some of the duplication and assuring that there is coherence in the presentation language.

2. The definition of "representative individual" is inconsistently presented at various points. The presentation differs in, for example, Paragraphs S9, 23, and the details of Paragraphs 60 - 70. Thus, the text is very ambiguous on the proper approach to take on identifying and calculating the dose to the representative individual. It is not clear if the "representative individual" is an average or maximum. At times the text suggests approaches akin to the average member of the critical group. However, in other portions the text clearly articulates for approaches akin to a maximum exposed individual. A clear, single definition that avoids the maximum is necessary.

3. For probabilistic risk assessment, the document suggests that if the 95 percentile of the dose distribution is within a factor of 3 of the limit, compliance has been demonstrated. This is useful guidance, but a clear point of compliance or algorithm for compliance would be helpful. At the least, the ICRP should advise regulators to make the compliance algorithm clear.

4. Scattered throughout the text are references to "95% of the population" without clear indication of which population (the critical group population? the general population?). For the "95% of the population," it appears that this is in reference to the general population. However, in the context currently in the text, the general reader will assume that compliance will be demonstrated using the 95% of the dose distribution calculated for the representative individual. In an analysis of critical group's behavior and potential exposure, the proper quantile to estimate the dose to the representative individual (assuming it is meant to be similar to the average member of the critical group) will vary depending on the overall level of conservatism of the analysis and uncertainties present. In a properly done analysis of the critical group, it may be very appropriate to use the mean dose from the distribution as the estimate of the representative individual. If the critical group is defined properly, the mean dose of the critical group's dose distribution should satisfy the additional criteria being discussed in the ICRP document that 95% of the general population will have doses less than this mean dose. The ICRP document

should discuss clearly the difference between the selection of the compliance point on the dose distribution of the critical group's analysis and the compliance point on the general population dose distribution.

5. The NRC staff agrees with the stated ICRP position in Paragraph 46 that "...the goal should be to perform a realistic evaluation of the dose." However, the stated goal appears to be inconsistent with the additional guidance in Section 2.5. For example, paragraph 49 describes screening methods and other paragraphs describe deterministic methods with conservative assumptions on habits. In fact, the goal of any analysis is to ensure that real dose to the population will be below the dose constraint. This can be accomplished by highly unrealistic assessments, such as screening analyses, or with ultra-realistic probabilistic analyses with the common factor being that the compliance measure does not underestimate the dose. Thus there should be clarification of how the guidance relates to the overall goal, and to the concepts of realism, homogeneity, and sustainability.

6. The NRC staff agrees with the general thrust that a small set of age categories are sufficient for prospective dose evaluations. It should be clear that when the calculation is prospectively addressing hypothetical individuals the smaller set of ages apply. When actual individuals and populations have been identified and can be characterized to some degree, the more detailed age coefficients are appropriate.

7. The NRC staff recommends that the ICRP not attempt to complete a revision of this foundation document in the short time period before the ICRP meeting in Geneva, as implied by the “Summary of the 2005 Paris Meeting” provided on the ICRP web site, and instead recommends that ICRP take sufficient time to thoroughly consider and revise the report.

Specific Comments:

1. Paragraph S2. The third sentence should be corrected to read, "In setting its dose constraint for the public, the Commission recognizes the inherent variability in estimated annual effective dose to members of the public and the transient nature of many extreme exposure situations."

2. Paragraph 9. The statement is made that guidance on the protection of future individuals in the case of disposal of long-lived radionuclides is provided in ICRP 81. Is this statement intended to imply the current guidance document does not apply to disposal, or that this document provides additional guidance?

3. Paragraph 23. The ICRP is introducing a new concept (i.e., "representative individual") who "receives the highest dose" as a means to protect the public. A lot of discussion in the guidance is devoted to addressing what is meant by "highest dose" - ICRP must clearly describe what is meant by highest - subsequent comments will identify potential inconsistencies in the text. NRC staff recommends that the concept continue to parallel the average member of the critical group, and not become a theoretical highest exposure.

4. Paragraph 42, introduces the term "committed effective dose." A footnote should be added to clarify if, and when, this is a 50-year or 70-year committed effective dose.

5. Paragraph 61. The representative individual is meant to be the "...average habits of a small number of individuals representative of those most exposed...", which is consistent with prior definitions of the average member of the critical group. However, paragraph B44 would appear to require calculation of the dose the maximally exposed individual. NRC staff agree with the concept expressed in Paragraph 61, and not the calculation of a maximum exposure.

6. Paragraph 74, refers to "committed dose." In this paragraph it would appear to be a 70 year calculation. But Paragraph 56 would appear to suggest a 50 year calculation. The guidance should be clarified and made coherent.

7. Appendix A, page A-2, paragraph A7, indicates the methodology used for the report is based on intake pathways for milk, green vegetables, and beef and the data is from the UK. Were pathways for other products considered, e.g., poultry and fish? Data should be provided for other meat products that are more likely to be ingested by a hypothetical individual who is representative of the public in a particular region.

8. Appendix A, Page A-6, Table 2. The ratio's vary considerably, and the report indicates that the 1-year individual is not necessarily representative of this age-span, 0 to < 6-years. A greater articulation of the use and impacts of these tables is desirable.

9. Appendix B, in general, is difficult to understand and needs to be simplified before members of the public can be expected to reasonably participate in the evaluation of this report.

Editorial comments:

1. Paragraph S2, third sentence, "In setting its the dose constraint..." The word "the" should be removed.

2. Paragraph 26, last sentence, "...where it is not merely sufficient to meet dose the dose constraint,..." The first "dose" should be removed.

3. Paragraph 35, sentence 1 should be corrected to delete the word "retrospectively" that is redundant

4. Paragraph 75, second line, "...with the dose the dose constraint..." The first "the dose" should be removed.

5. Paragraph 84, sentence 1, change "that" to "than."