

The Concept and Use of Reference  
Animals and Plants for the Purposes  
of Environmental Protection  
Task Group of ICRP Main Commission

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 Foundation Document "The Concept and Use of Reference Animals and Plants for the Purposes of Environmental Protection". The opportunity to submit and review other stakeholder comments on Commission documents is greatly appreciated.

General Comment:

1. The U.S. Nuclear Regulatory Commission (NRC) continues to have significant concerns regarding the need and value of developing a separate radiation protection system for the protection of the environment.
2. Throughout the draft publication the need for additional information and data is highlighted. Significant additional research and model development, including gathering effects data for most species at low environmentally significant dose rates, will be required to bolster the scientific basis. The number of uncertainties associated with the use of a reference flora and fauna, given the wide range of species and exposure pathways, is very great. As such, the document is a statement of a research program, not a foundation for making policy recommendations.

Given that this will take some time to develop, it seem premature for the ICRP to start development of a system before the scientific basis has been adequately formed. However, the ICRP's publication as a Foundation Document, and the inclusion of the material in the draft recommendations available last year implies that certain positions and conclusions have already been reached. The NRC staff does not agree, and recommends that ICRP clearly separate any program for examining the scientific issues with protection of flora and fauna from statements that could be read as recommendations of policy.

3. The draft publication lists several reasons for further developing the ICRP framework including: (1) demands upon regulators to comply with the requirements of legislation directly aimed at the protection of wildlife and natural habitats; (2) the need to make environmental impact assessments; and (3) the need to harmonize approaches to industrial regulation. Having such a framework would not significantly benefit NRC activities. Our regulatory framework, regulations and guidance are sufficient to prepare environment impact assessments, and demonstrate, if appropriate, that the environment is adequately protected with appropriate mitigation strategies to manage potential environmental harm. Thus, the proposals could result in no added benefit while being difficult to implement.
4. The draft recognizes that the approach discussed in the report cannot reflect the full range of biological diversity, or provide a general assessment of the effects of radiation on the environment as a whole. A safety case that the current system of regulations

(i.e., if humans are protected, then so is the environment) is an unacceptable method or has weaknesses has not been demonstrated. To the contrary, the empirical evidence demonstrates that the environment is being adequately protected by the current system of radiation protection. This fact is recognized in paragraph (6) of the draft publication ("Thus it is probably true that the human habitat has been afforded a fairly high level of protection through the application of the current system of protection.). The potential burden to regulators and industry associated with developing and implementing such a new system is not balanced by the any increased protection to non-human species.

Specific Comments:

1. Paragraph 8. The paragraph states, "The question of whether one should protect individuals or populations from harmful effects of radiation in any particular circumstance, however, is not an issue of direct concern to the Commission." This approach appears inconsistent with the ICRP's aim to safeguard the environment by reducing the frequency of effects likely to cause early mortality or reduced reproductive success to levels where they would have a negligible impact on conservation of species, maintenance of bio-diversity, or the health and status of natural habitats or communities. The draft publication also notes that a large number of animals and plants are already afforded protection at the level of the individual and that it would be inappropriate to provide advice that could not be used in such legal context. While the NRC recognizes that there are appreciable scientific difficulties in estimating the impact on communities of species and the ecosystem based on impacts of individual species, the NRC believes that affording every individual the same level of protection as threatened and endangered species is problematic. Such an approach could significantly restrict the beneficial uses of radioactive materials. Furthermore, harm to threatened and endangered species is largely achieved by protection of critical habitat rather than by restricting discharges of pollutants.
2. Paragraph 13. The NRC disagrees with the approach of comparing derived consideration levels (dose rates) for reference animals and plants to normal natural background dose rates of the reference organisms. Natural background for humans varies by location around the world because of many factors including local geology and elevation. Natural background will vary even more significantly among other species. For example, terrestrial mammals will have vastly different natural backgrounds than fish or even earthworms. Add to this the variability of natural background globally, the approach proposed by the ICRP will make practical evaluation exceedingly complex or potentially meaningless.
3. Paragraph 13. The text implies that levels of exposure at or above background are of concern. Our understanding of the available data is that exposure rates up to several orders of magnitude above background have not posed concerns of the types stated in the objectives.
4. Paragraph 14. The phrase "reducing the frequency of effects..." implies that there currently are effects, yet other portions of the report indicate that such effects are not existent. The task group should clearly articulate the objective(s) of the document (i.e., minimize, limit, prevent the occurrence of an effect).

5. Paragraph 15. This paragraph states that the ICRP intends to develop this environmental protection system so there is commonality in its basic approach to dosimetric modeling used for human protection. The draft further suggests that reference dose per unit internal and external exposure values would be developed. Again, this is an added complexity that is not needed to address an issue that should be adequately and quickly resolved with a "screening" calculation. It is difficult to understand the need for, or utility of a gastrointestinal or lung model that would be developed for reference animals and plants.
6. Paragraph 20. This paragraph states that the relevant effects considered are early mortality, morbidity, reduced reproductive success, or some form of observable cytogenetic damage, irrespective of whether or not they arose from stochastic or non-stochastic dose effect relationships. Defining "early" mortality may be difficult for species given natural variation and complex ecosystem interactions among species. It is also unclear how early mortality or morbidity of certain individuals, or individual species, would effect the overall health of the environment.
7. Paragraph 27. It is not clear why the candidate types in the first and second bullets are different. The lists in both bullets should be the same.
8. Paragraph 32. It is not clear in the last sentence whether the "Family" level or "Super Family" level "...has therefore been suggested as being the most suitable." From later discussion, it appears that the Family level was chosen.
9. Paragraph 51. By including the various stages of development, the original set of 12 reference plants and animals seems to be expanded by 3 or 4 times. Thus the reference system is much more complex than seemingly first described.