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Principles and issues in radiological ecological risk assessment

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This paper provides a bridge between the fields of ecological risk assessment (ERA) and radioecology by presenting key biota dose assessment issues identified in the US Department of Energy's Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota in a manner consistent with the US Environmental Protection Agency's framework for ERA. Current radiological ERA methods and data are intended for use in protecting natural populations of biota, rather than individual members of a population. Potentially susceptible receptors include vertebrates and terrestrial plants. One must ensure that all media, radionuclides (including short-lived radioactive decay products), types of radiations (i.e., alpha particles, electrons, and photons), and pathways (i.e., internal and external contamination) are combined in each exposure scenario. The relative biological effectiveness of alpha particles with respect to deterministic effects must also be considered. Expected safe levels of exposure are available for the protection of natural populations of aquatic biota (10 mGy d<sup>-1</sup>) and terrestrial plants (10 mGy d<sup>-1</sup>) and animals (1 mGy d<sup>-1</sup>) and are appropriate for use in all radiological ERA tiers, provided that appropriate exposure assumptions are used. Caution must be exercised (and a thorough justification provided) if more restrictive limits are selected, to ensure that the supporting data are of high quality, reproducible, and clearly relevant to the protection of natural populations.

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