

# Hosseini et al. Background dose-rates to reference animals and plants arising from exposure to naturally occurring radionuclides in aquatic environments JRP

Hosseini, A., Beresford, N.A., Brown, J.E., Jones, D.G., Phaneuf, E., Thørring, H., Yankovich, T. 2010.

Background dose-rates to reference animals and plants arising from exposure to naturally occurring radionuclides in aquatic environments. *J. Radiological Prot.*, 30. 235-264.

In order to put dose-rates derived in environmental impact assessments into context, the International Commission on Radiological Protection (ICRP) has recommended the structuring of effects data according to background exposure levels. The ICRP has also recommended a suite of reference animals and plants (RAPs), including seven aquatic organisms, for use within their developing framework. In light of these propositions, the objective of this work was to collate information on activity concentrations of naturally occurring primordial radionuclides for marine and freshwater ecosystems and apply appropriate dosimetry models to derive absorbed dose-rates. Although coverage of activity concentration data is comprehensive for sediment and water, few, or in some cases no, data were found for some RAPs, e.g. for frogs (Ranidae) and freshwater grasses (Poaceae) for most radionuclides. The activity concentrations for individual radionuclides in both organisms and their habitat often exhibit standard deviations that are substantially greater than arithmetic mean values, reflecting large variability in activity concentrations. To take account of variability a probabilistic approach was adopted. The dominating radionuclides contributing to exposure in the RAPs are  $^{40}\text{K}$ ,  $^{210}\text{Po}$  and  $^{226}\text{Ra}$ . The mean unweighted and weighted dose-rates for aquatic RAPs are in the ranges  $0.07\text{--}0.39\text{ }\mu\text{Gy h}^{-1}$  and  $0.37\text{--}1.9\text{ }\mu\text{Gy h}^{-1}$  respectively.

 Available as free download until the end of 2010: <http://iopscience.iop.org/0952-4746/30/2/S03>