



AN ASSESSMENT OF HUMAN EXPOSURE TO ENVIRONMENTAL RADIATION IN THE CANADIAN ARCTIC

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The primary objective of the study was to review and integrate the diverse data on environmental radioactivity levels in the Canadian Arctic and to provide radiation dose estimates from both natural and artificial sources. A related objective was to assess the relative contributions of different exposure pathways.

A database of approximately 7000 records was compiled for radioactivity analyses of various environmental media (abiotic and biotic) as well as radiation field measurements conducted since 1988. The study revealed that there is a paucity of Canadian data for radionuclide concentrations in small game and edible vegetation as well as for Po-210 in marine mammals. The data on indoor radon levels were also found to be inadequate.

In order to examine the radiation exposure patterns in the Canadian Arctic, doses were calculated for residents of five aboriginal communities representing the diverse geographical locations, distinct ethnic populations and dissimilar dietary habits of this vast region. Estimated annual doses to the typical adult inhabitant were significantly elevated (2 to 9 mSv) compared to the doses to most Canadians as represented by the non-native resident of the city of Yellowknife (1 mSv). Calculated doses to one-year old infants and to adult members of a critical group, that relied almost entirely on country-food diets, were even higher. The doses arise primarily from the consumption of caribou meat. One single radionuclide, Po-210, contributed from 57% to 72% of the total dose. This large contribution from Po-210 arises, in part, from the recent recommendations of ICRP-67 wherein a significant increase in the dose conversion factor was recommended.

In Phase II of the study, in order to refine the dose estimates, the data were analyzed to include left-censored measurements. In addition, statistical techniques were employed to more precisely calculate the doses from key exposure pathways. These analyses modified the annual dose estimates by up to 2.5 mSv but did not alter the general exposure patterns. Substitution of non-Canadian data where Canadian data were lacking generally had a modest effect on dose estimates with the exception of the doses resulting from the ingestion of Po-210 from marine invertebrates.