

RadCon: A new Australasian radiological dose assessment model

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ANSTO developed and implemented a radiological dose assessment model, RadCon, with the emphasis on tropical and subtropical climates. An overview of RadCon will be given in this paper.

Models for dose assessment were developed using information on the distribution, transport and biological effects from studies mainly in the temperate and cold regions of the world, almost exclusively in the Northern Hemisphere. Only limited information is currently available for tropical and subtropical regions.

The original motivation of this work was to investigate these information deficiencies and commence targeted research into that data with the most significant effect on the radiological consequences for the Australian and South East Asian region. Aside from the identification and acquisition of the available data, a computational tool, RadCon, was developed and implemented at ANSTO, to be used in dose assessment and to assist in the identification of the most relevant data.

RadCon was developed as a simple and flexible model to assess the radiological consequences, as dose, to humans resulting from short-term release or accidental release of radionuclides to the atmosphere. RadCon implements internal exposure from inhalation and ingestion as well as external exposure from the passing cloud and from radionuclides deposited on the ground. Atmospheric dispersion and ground deposition is estimated externally to the program using meteorological models or measured data. RadCon accepts time-dependent air and ground concentration which would be the output of an atmospheric transport model suitable for the assessment site.

In designing RadCon, the variability of the region (e.g. lifestyle and diets of groups of the population, soil types, etc.) was taken into

account. RadCon presents a graphical interface to the user, which allows the user to set optional parameters over the region under study. In a manner similar to a geographic information system, the user specifies site specific information over the two-dimensional region of interest, such as soil type, dietary components of humans and animals, race and lifestyle.

RadCon was written in the Java programming language, resulting in portability across computer platforms. The estimated dose to man is displayed in coloured concentration contours, stepping through time, superimposed on the area of interest and the actual values at a particular location can be obtained by selecting the particular grid location.

To evaluate the RadCon mathematical model and its implementation, ANSTO is participating in the BIOMASS (BIOsphere Modelling and ASSESSment) model inter-comparison program. BIOMASS is a program sponsored by the International Atomic Energy Agency. ANSTO is participating with the RadCon model in a case study of a contaminated area from the Chernobyl accident. The results generated by RadCon for this case study were very encouraging. Areas of potential model improvement were identified and some have been incorporated. Data sensitivity analysis was implemented in RadCon, allowing the user to identify which parameter entered into the model has the most impact on the estimated dose, under the conditions of the study.