

(1) DS02R1: new dose estimates in use for the latest RERF studies

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Abstract—The dose estimates for the atomic bomb survivors followed by RERF have been calculated by a series of “dosimetry systems” created over the years by outside scientific groups, of which the most recent is Dosimetry System 2002 (DS02). DS02 calculates the source terms of prompt and delayed neutrons and gamma rays emanating from the bombs as fluences: numbers of radiations per unit cross-sectional area, in categories of direction and energy. Based on calculations of transport through the atmosphere in an air-over-flat-ground model, these are converted to kerma in air at 1 m above ground at various distances (“free-in-air kerma”) from the bomb hypocenters. In addition the transported fluences are used with detailed tabulations of results from Monte Carlo calculations to calculate shielding by terrain and structures (“shielded kerma” at the survivor’s shielded location) and organ dose (absorbed dose to a particular organ, accounting for the body’s self-shielding). RERF recently introduced a new set of dose estimates, DS02R1, based on several years’ intensive work on improving survivors’ input data on location and shielding by vetting original source documents, using a Geographical Information System (GIS) to correct for distortions in the 1945 US Army maps that were used to record locations in map coordinates, providing more universal and accurate terrain shielding input data from contemporary high resolution digital terrain elevation data, and correcting a number of other specific sources of inaccuracy. The systematic differences between DS02 and DS02R1 are relatively modest, but there are more substantial differences for individual survivors that are thought to reduce random errors. This talk will describe the development of DS02R1 and show the differences in dose estimates as well as the corresponding differences in risk estimates for a set of recent cancer mortality data.