

TPM-C.7

ESTIMATION OF ORGAN DOSES FROM DIAGNOSTIC X-RAYS FOR DOSE RECONSTRUCTION.* G.R. Davidson,¹ R.L. Kathren,² V.E. Shockley,³ and E.M. Thomas⁴ (¹GRD Analytics, Inc., Glenview, IL; ²Washington State University, Richland, WA; ³Dade Moeller & Associates, Inc., Richland, WA; ⁴Oak Ridge Associated Universities, Cincinnati, OH)

ICRP Publication 34 provides dose factors that can be used to estimate doses to selected organs of a patient from diagnostic x-ray examinations. The factors are based on Monte Carlo calculations for reference phantoms. For adult patients, factors are provided for seven organs for standard x-ray projection geometries involving well-collimated beams. Reconstruction of occupational medical doses to claimants under the Energy Employees Occupational Illness Compensation Program Act may require estimates of doses to organs not treated in ICRP 34 and estimates for x-rays taken in earlier periods using different geometries with less collimation. This presentation describes a method for using the ICRP 34 dose factors to make order-of-magnitude estimates of doses to all parts of the body for such situations. The approach is based on the determination of organ location relative to the beam and the use of published x-ray scattering and penetration data. The method has been applied to the estimation of doses due to pelvis AP x rays taken using parameters reported in use prior to 1958. Doses were estimated for organs inside and outside the beam and for different regions of skin on the exit side of the body. For an entrance kerma of 1.68 cGy and a 2 mm Al HVL beam, doses to the lungs and thyroid were estimated as 1.29E-01 and 1.38E-03 cGy, respectively. This compared with values of 1.04E-01 and 2.68E-04 cGy, respectively, which were calculated independently using Monte-Carlo-based dose factors.

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TPM-C.8

EVALUATING UNCERTAINTY IN DOSE AND DOSE-RATE EFFECTIVENESS FACTORS FOR LOW-LET RADIATION FOR USE IN RISK ESTIMATION.* J.R. Trabalka, A.I. Apostoaei, F.O. Hoffman, D.C. Kocher, and B.A. Thomas (SENES Oak Ridge, Inc., 102 Donner Drive, Oak Ridge, TN 37830)

This presentation provides an overview of work for the National Institute for Occupational Safety and Health (NIOSH) to reevaluate dose and dose-rate effectiveness factors (DDREFs) for low-LET radiation used in the

Interactive RadioEpidemiological Program (IREP). IREP is used to estimate probability of causation of radiogenic cancer. Radiation risk estimates used in IREP are obtained primarily from studies of Japanese atomic-bomb survivors who received an acute dose of (mainly) low-LET radiation at a very high dose rate. In order to account for an assumption of reduced effectiveness of low-LET radiation in inducing cancer in humans at low doses and low dose rates, DDREFs are applied to cancer risk coefficients for all solid tumors that were derived from epidemiological data based on a linear, no-threshold (LNT) model. Our main purpose is to provide NIOSH with alternatives to probability distributions of DDREFs currently used in IREP, based on a comprehensive evaluation of current information on low-dose extrapolation of radiation risks. Because the LNT model is now under challenge, a broad-based review and analysis was required that covered not only the relevant epidemiological, radiobiological, and microdosimetric information, but also emerging information on a diverse array of potential modifiers of the model, including adaptive responses, bystander effects, genomic instability, low-dose hyper-radiosensitivity, existence of a threshold, and hormetic responses. A critical piece of information is the revised set of dose-responses for cancer incidence in the atomic-bomb survivors, which is based on the new DS02 dosimetry system and additional follow-up of the cohort. This review will be used by NIOSH to determine whether the current version of IREP appropriately represents all sources of uncertainty in DDREF.

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TPM-C.9

METHODOLOGY FOR ESTIMATING ELECTRON DOSES TO SKIN OF ATOMIC VETERANS FROM DERMAL CONTAMINATION. A.I. Apostoaei and D.C. Kocher (SENES Oak Ridge, Inc., 102 Donner Drive, Oak Ridge, TN 37830)

Many military personnel who participated in the atmospheric nuclear-weapons testing program (atomic veterans) were subjected to contamination of skin and clothing by radioactive particles, and such contamination could have been an important contributor to external doses to skin. This presentation describes a methodology for estimating contamination of skin and clothing by deposition of descending or resuspended fallout from a nuclear weapon detonation or by contact with contaminated ground and other surfaces. Modeling of contamination by direct contact relies on relevant data on soil loading on skin and clothing. Modeling of contamination by deposition is based on estimates of the fraction of incident material that is intercepted and

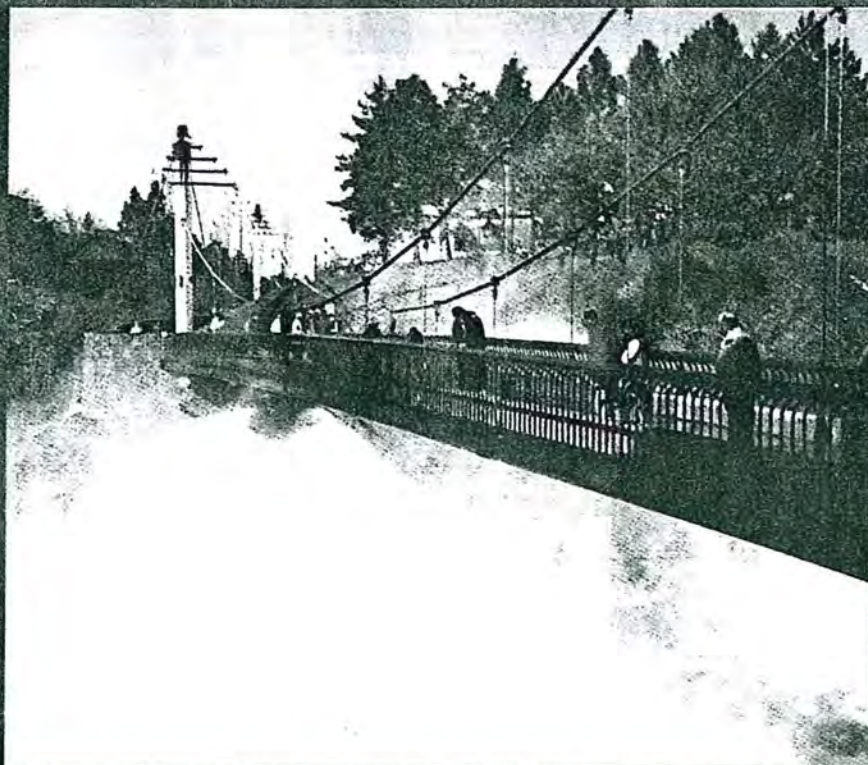
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