

# Health Effects Research at the United States Nuclear Regulatory Commission

Washington, DC 20555

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The U.S. Nuclear Regulatory Commission (NRC) radiation protection research program provides technical support to NRC in the areas of dose assessment and assessment of human health effects for reactor and nonreactor licensing, emergency preparedness, and nuclear security activities.

The program's scope includes development of technical bases for

radiation protection regulations

external exposure computer codes

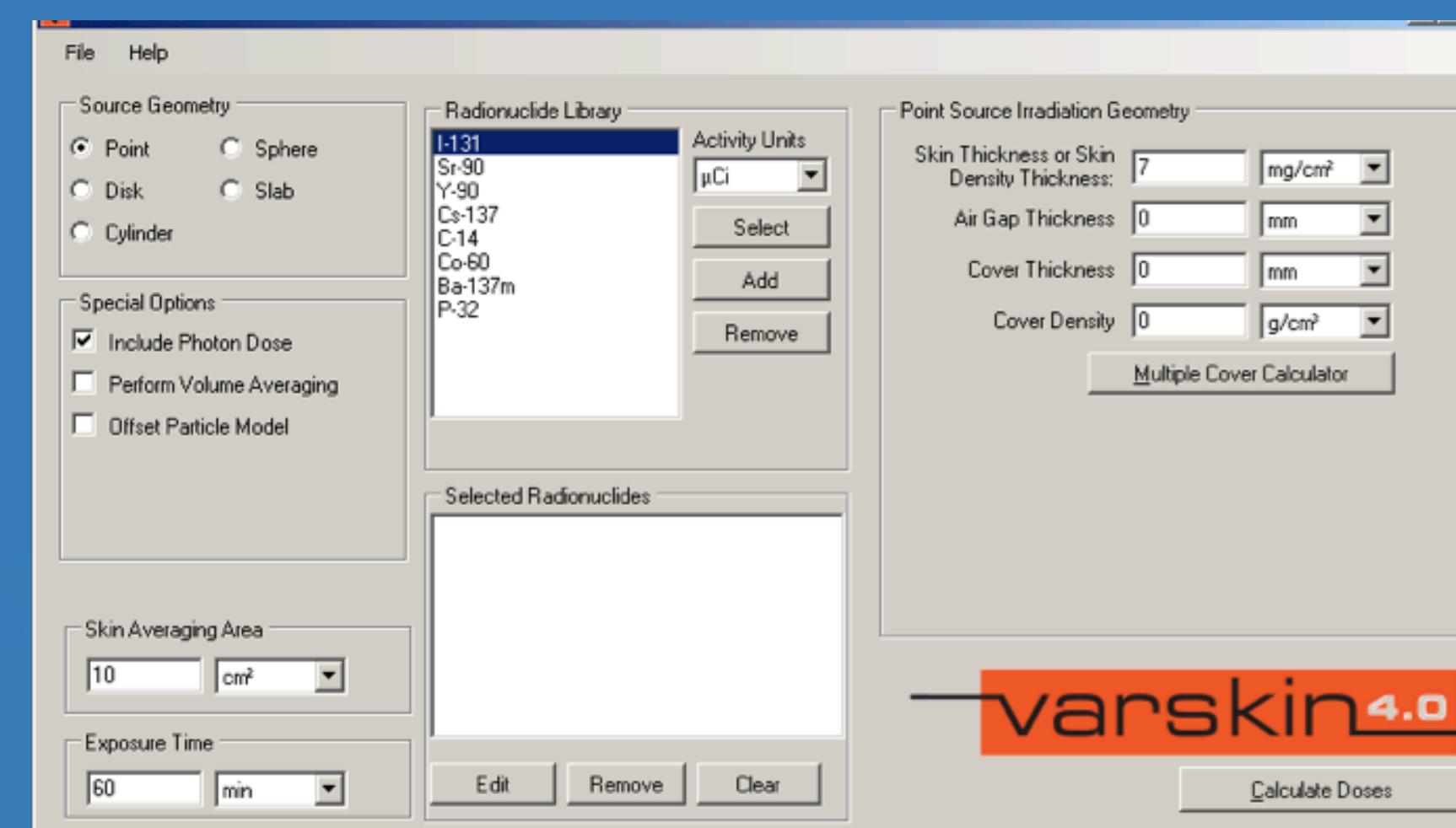
occupational exposure effluence databases

public health studies research

## National and International Activities

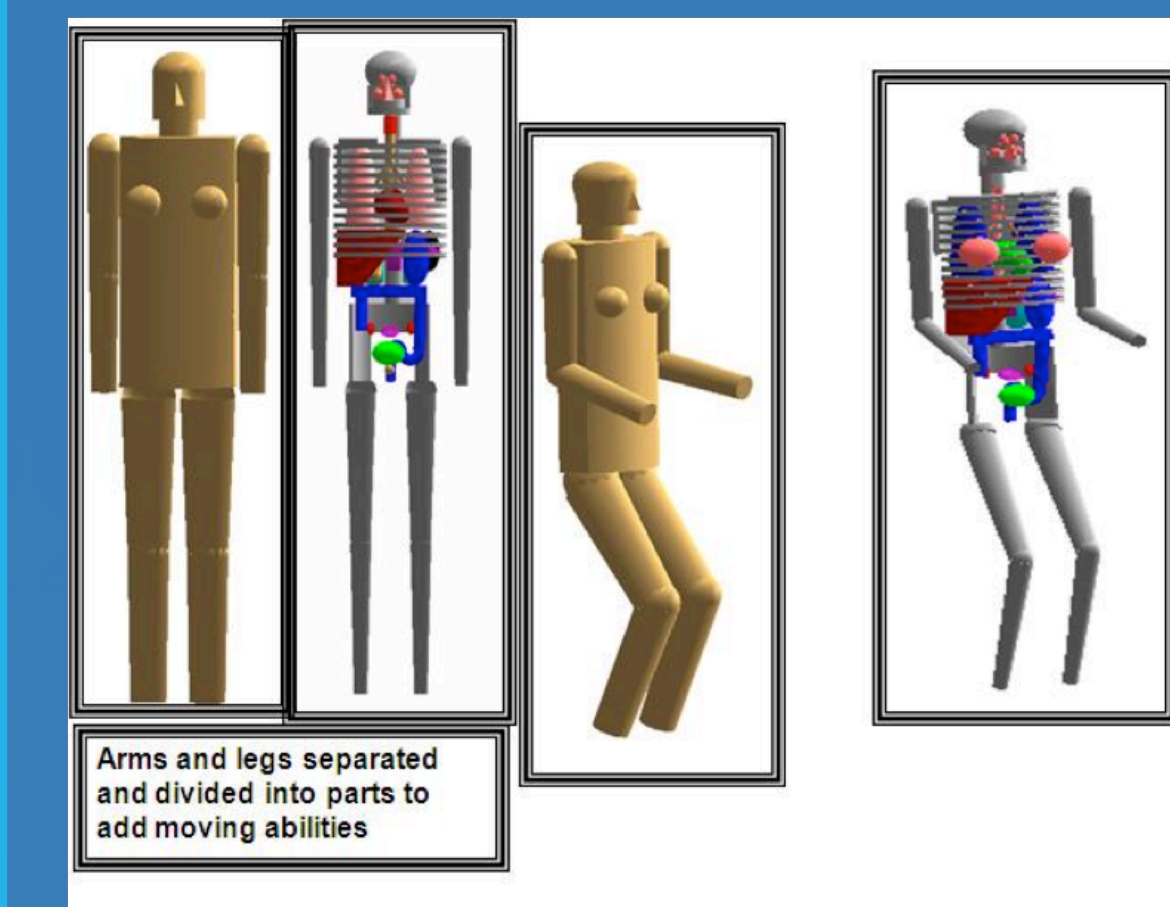
The Health Effects staff collaborates with national and international experts in health physics at national laboratories, universities and other organizations including: Interagency Steering Committee on Radiation Standards, National Council on Radiation Protection and Measurements, National Academies, Nuclear Energy Agency, Information System on Occupational Exposure, International Commission on Radiological Protection, International Atomic Energy Agency, and the French Institute for Radiological Protection and Nuclear Safety.

## VARSKIN Skin Computer Code



The NRC sponsored the development of the VARSKIN code to model and calculate skin dose (from both beta and gamma sources) from skin or protective clothing contamination for regulatory requirements. VARSKIN 4 offers the ability to compute the dose at any skin depth or skin volume, with point, disk, cylindrical, spherical, or slab (rectangular) sources. It enables users to compute doses from multiple sources. VARSKIN 4 is available from the Radiation Safety Information Computational Center.

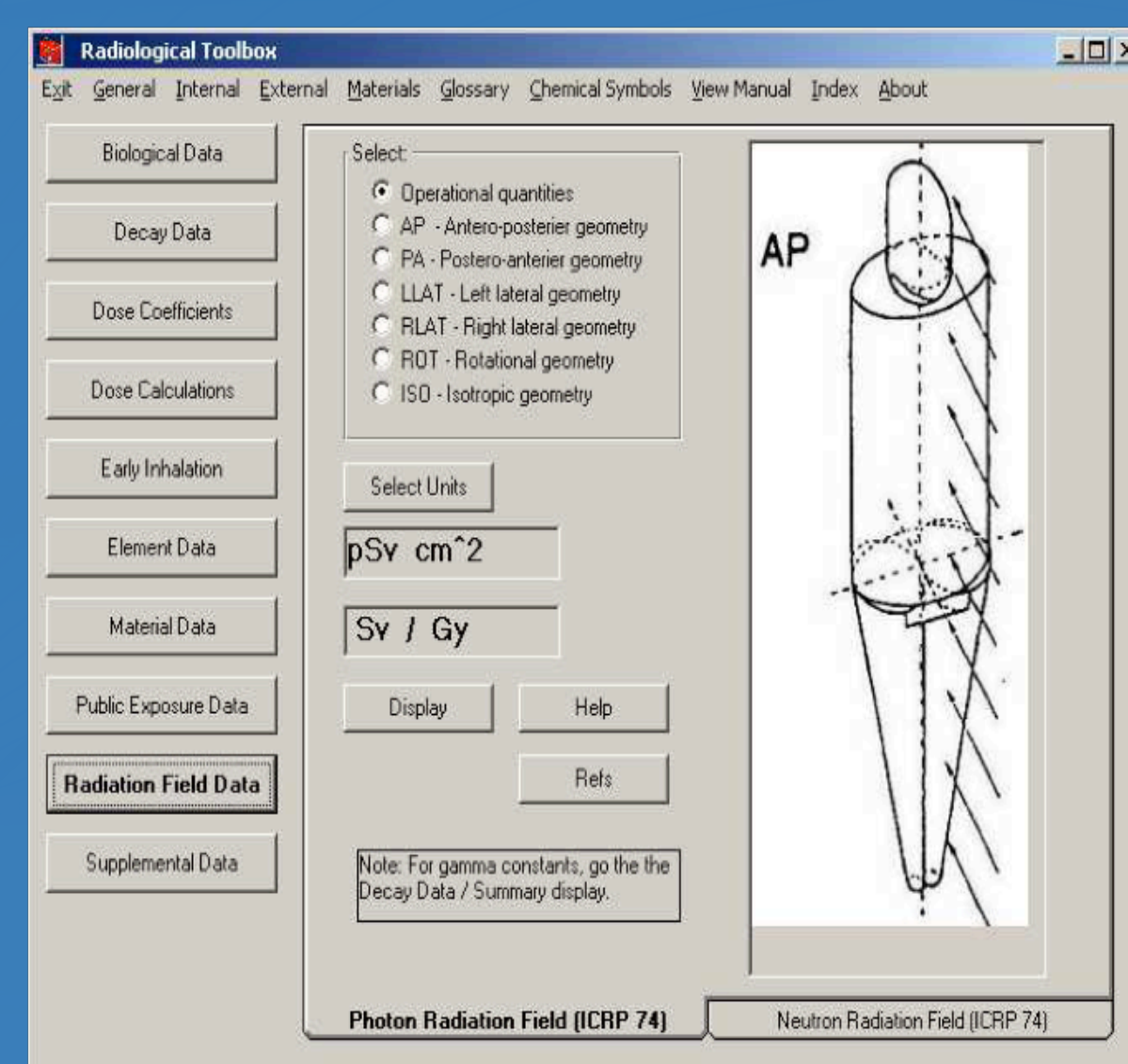
## Phantom with Moving Arms and Legs (PIMAL)



The NRC has partnered with Oak Ridge National Laboratory to develop two types of humanoid "phantom with moving arms and legs" or PIMAL models. One type is the update of the Medical Internal radiation Dose (MIRD) phantom with the substitution of movable arms and legs for the fixed

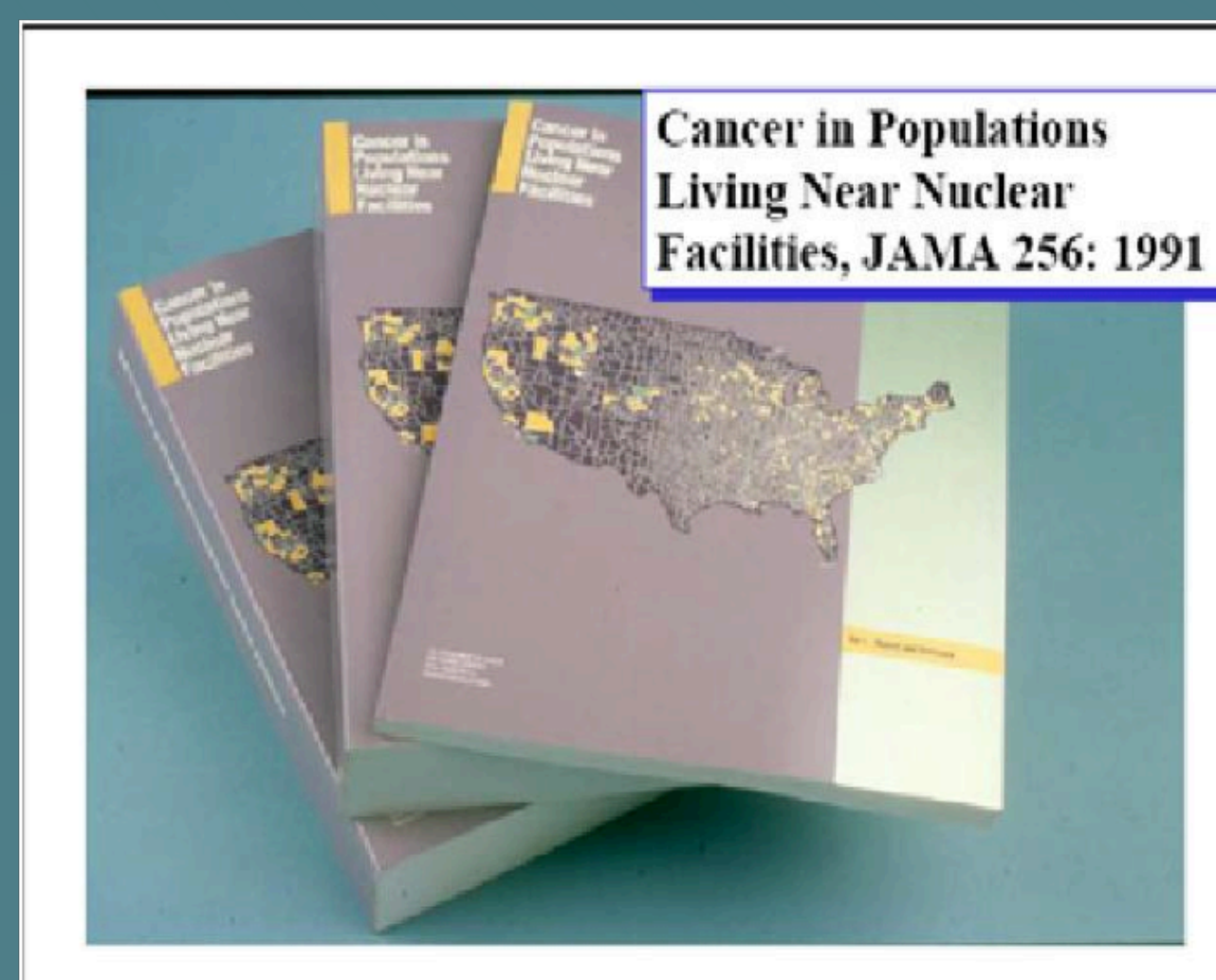
ones in MIRD. The second type is to be a hybrid with the same arms and legs as those in the new MIRD but with a voxelized torso. PIMAL has demonstrated that state-of-the-art phantoms greatly ease the burden of setting up and executing a radiation transport problem and retrieving the dosimetry results.

## Radiological Toolbox



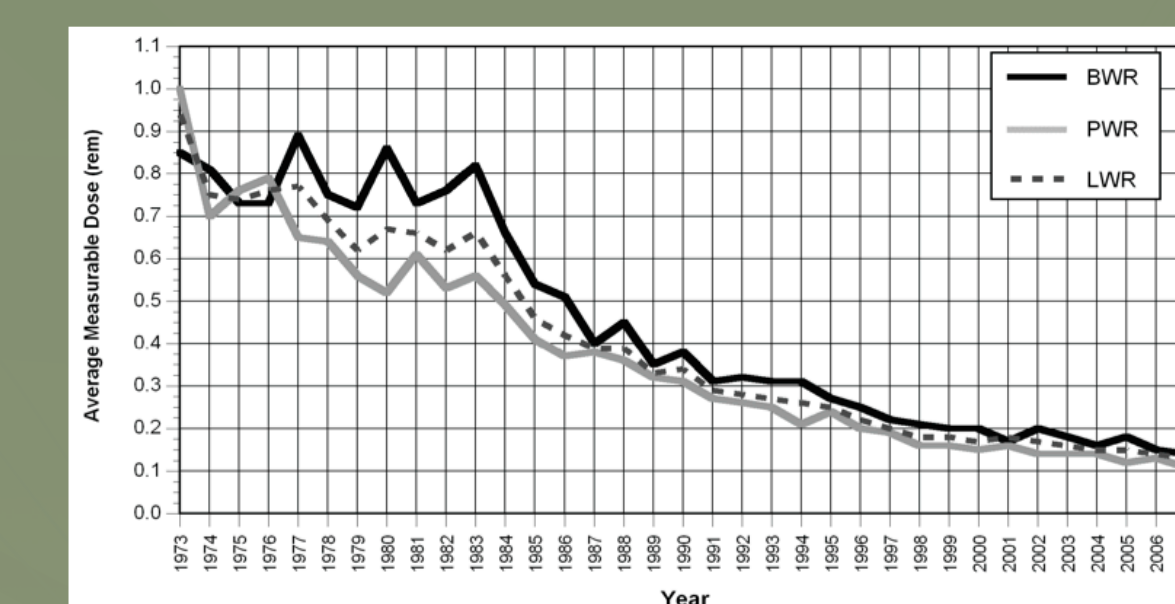
The NRC, in conjunction with Oak Ridge National Laboratory, developed the Radiological Toolbox as a means to quickly access databases needed for radiation protection, shielding, and dosimetry calculations. The Radiological Toolbox is essentially an electronic handbook with data such as: radioactive decay data, biokinetic data, internal and external dose coefficients, radiation interaction coefficients, and kerma coefficients. The program and user manual can be downloaded from the NRC public Website at <http://www.nrc.gov/about-nrc/regulatory/research/radiological-toolbox.html>.

## Analysis of Cancer Risk in Populations Living Near Nuclear Facilities: Phase 1 Feasibility Study



The NRC has asked the U.S. National Academy of Sciences (NAS) to perform a state-of-the-art study on cancer risk for populations living near NRC-licensed nuclear facilities. Through this NRC-sponsored study, NAS will use its expertise to update the 1990 report, entitled "Cancer in Populations Living Near Nuclear Facilities," published by the U.S. National Institutes of Health, National Cancer Institute (NCI). The NRC currently uses this 1990 NCI report as a primary resource when communicating with the public about cancer mortality risk in counties that contain or are adjacent to nuclear power facilities.

## Radiation Exposure Information and Reporting System (REIRS)



The Radiation Exposure Information Reporting System (REIRS) is a database of occupational radiation exposure data from NRC licensees. Data from the REIRS database can be found in NUREG-0713, "Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities," which is published in annual volumes and also available in electronic format on the internet at [www.reirs.com](http://www.reirs.com) and [www.nrc.gov](http://www.nrc.gov). The report is used in the establishment of priorities for the utilization of NRC health physics resources: research, standards development, regulatory program development, and may be used in planning of epidemiological studies.