

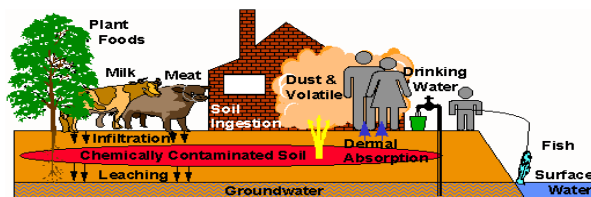
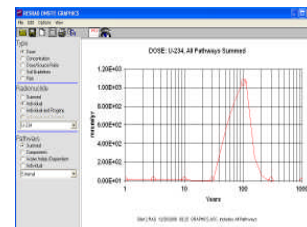
RESRAD Computer Code – Evaluation of Radioactively Contaminated Sites

Challenge

The evaluation of sites with radioactive contamination was a problem until the RESidual RADioactivity (RESRAD) Computer Code was first released in 1989. The RESRAD code has been updated since then to improve the models within the codes, to operate on new computer platforms, to use new state of science radiation dose and risk factors, and to calculate cleanup criteria (“Authorized Limits”) for radioactively contaminated sites. A series of similar codes have been developed to address radiation dose, risk, and cleanup criteria for buildings (RESRAD-Build), personal property (RESRAD-Recycle), biota (RESRAD-Biota), and off-site receptors (RESRAD-Offsite).

Technical Solution

The RESRAD codes use a pathway analysis method, in which radiation exposures are calculated by evaluation of each pathway of exposure. Input parameters can be changed by the user to reflect specific conditions and assumed future uses of the property. Radiological release criteria (“Authorized Limits”) can be calculated by inputting a dose limit. The original RESRAD code addresses on-site receptors. RESRAD-Offsite evaluates more distant receptors. RESRAD-Build analyzes the probable doses received by building occupants exposed to indoor contaminants, and RESRAD-Biota examines the dose from residual radioactivity on ecological receptors. All RESRAD codes have user-friendly interface and help files to assist users to run the codes and interpret results.



Tech Accomplishment

The RESRAD codes are the industry standard for the calculation of dose and risk at cleanup sites with residual radioactivity. They have been regularly updated to function on new computer platforms and to include the latest dosimetric values in their codes. The RESRAD codes are user-friendly. They are easy to install on a personal computer, through the use of self extracting files. Numerous DOE sites (including Hanford, Oak Ridge, Los Alamos, and Savannah River) have used RESRAD for determining authorized limits (i.e., cleanup criteria) for buildings, open land, and personal property. The RESRAD codes also are widely used by NRC licensees, NRC staff, and other Federal and State regulatory personnel and their contractors. Many supporting documents have been prepared to help users use RESRAD codes and interpret results. Training workshops have been conducted to help users understand the models used in the code, to learn how to collect data to input to the code, and to assess the sensitivity of input parameters and the uncertainty of output.

Site Project & Identifier

Argonne National Laboratory, Environmental Science Division – RESRAD Program

Tech Stage: Deployed

Widely Used and Maintained

RESRAD codes are used at more than 300 sites since its first release in 1989.

Impact

The RESRAD codes have provided a firm, scientific basis for determining the radiation dose, radiation risk, and authorized limits (i.e., radiological release or cleanup criteria) at numerous DOE sites, including Hanford, Mound, Ashtabula, SPRU, Brookhaven, Los Alamos, and Argonne. The codes have been used for similar purposes at a wide range of non-DOE sites, most of which are licensed by the Nuclear Regulatory Commission. Savings through use of this tool is well in excess of the cost. For example, at the Mound T Building, cost savings was over \$8 million, through the use of approved authorized limits in lieu of demolition and building replacement.

Impact and Features

- Provide a scientifically defensible method for computing potential annual radiation doses and cancer risks to workers or the public from residual radioactivity in soil or other media.
- Calculate realistic site-specific authorized limits (i.e., radiological release or cleanup criteria) based on user-designated future property use with significant savings on cleanup cost.
- Supports analyses in decision making processes for decontamination and decommissioning.
- User can input site-specific data in lieu of conservative default data for realistic site-specific dose and risk assessment.
- Well documented benchmarking, validation and verification of codes including NRC and IAEA documents and journal articles.
- Strong international interest; foreign attendees at training workshops include citizens of Korea, China, Britain, Canada, Bulgaria, and South Africa.
- Training workshops are approved for continuing education credit by the American Academy of Health Physics.
- Training workshops have been held at DOE, NRC, and EPA offices, with more than 1000 people trained.

Vendor Info:

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Technology Name

- RESRAD computer codes
- Radiological Assessment
- Authorized Limits (i.e., radiological cleanup criteria)

Federal End Users Information

Most of DOE sites (e.g., Hanford, Brookhaven, Los Alamos, Oak Ridge, and Savannah River) have used the RESRAD codes

Federal Sponsor Information

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Web Links: <http://www.evs.anl.gov/resrad>

Challenge Category	Tech Solution Category
<ul style="list-style-type: none">• Radiological Evaluation• Radiological compliance• Future land use• Cleanup standards• Release of property without radiological restrictions	<ul style="list-style-type: none">• Computer model• Authorized Limits• Cleanup Criteria• Risk Assessment• Dose Assessment• Pathway Analysis