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Environmental Exposure Pathway and Dose Modeling

Complex environmental systems present challenges for evaluating the safety of contaminated sites and waste disposal facilities over long periods. Southwest Research Institute® (SwRI®) Center for Nuclear Waste Regulatory Analyses (CNWRA®) staff members have well-established technical expertise and experience developing and applying computer models to support long-term safety and environmental impact analyses of contaminated sites and disposal facilities.

SwRI BDOSE Model

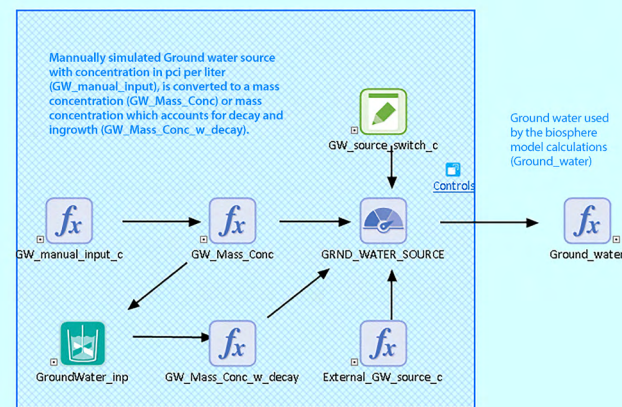
CNWRA scientists and engineers have developed and implemented the radiological dose model BDOSE to calculate probabilistic radiation doses to humans in a biosphere. The model evaluates hypothetical scenarios that reflect human behaviors and site characteristics that could facilitate release of and exposure to radionuclides. Recently, CNWRA staff developed a proof-of-concept radon gas transport model that implements an inhalation dose calculation applicable to buried radioactive wastes. Ongoing effort at CNWRA is focused on integrating this radon modeling capability into BDOSE.

Features

- Doses from direct radiation, inhalation, and ingestion of contaminated water and food products are calculated considering typical scenarios involving inadvertent intrusion into a waste facility, farming, gardening, and recreational activities
- Inventory of 49 radionuclides can be tracked in the modeled biosphere
- Full control of input parameters and data allows users to conform analyses to site-specific conditions
- Stochastic modeling capabilities support detailed sensitivity and uncertainty analyses to identify risk-significant variables
- Modular and flexible design allows customized enhancements to meet client needs, including execution of external models, integration into a larger total-system performance assessment model, and additional chemical pathways and exposures

Applications

- Disposal facility performance assessment modeling (e.g., radioactive wastes or uranium mill tailings)
- Pathway dose calculations for sites with radioactive contamination in soil, groundwater, or surface water
- Indoor and outdoor radon inhalation dose calculations considering a subsurface radium source



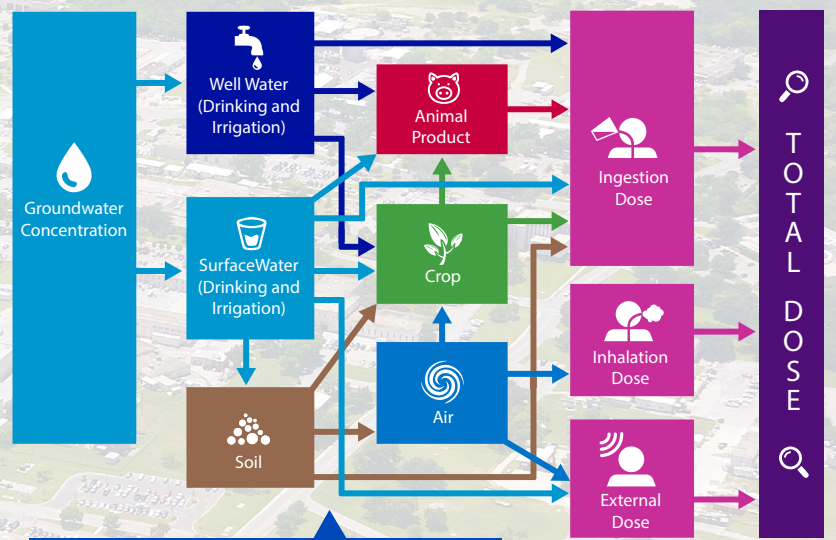
BDOSE utilizes objects to implement calculations and show information flow while on-screen text assists users.



Scatterplot analysis of BDOSE output shows how variation in a sampled input parameter affects the calculated dose.

Benefits

- State-of-the-art modeling capabilities and flexibility to intuitively evaluate a variety of site-specific biosphere pathway and dose assessment scenarios
- Stochastic modeling and analysis capabilities that support assessments of significant dose contributors
- Quality assurance testing of other codes (e.g., benchmarking analyses)
- Complete biosphere model that reduces the development effort for a site-specific performance assessment model



Detailed biosphere pathway modeling capabilities in BDOSE address a complex suite of environmental features and processes.

We welcome your inquiries.
For more information, please contact:

Patrick LaPlante
Staff Scientist
703.469.8955
patrick.laplante@swri.org

Osvaldo Pensado, PhD
Staff Scientist
210.522.6084
osvaldo.pensado@swri.org

SwRI headquarters in San Antonio

Geosciences and Engineering Department

ged.swri.org

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ask@swri.org

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