# Radon Transport in Soil and Vegetation II. Biohydrogeologic Model (S11-kozak143750-Oral)

Authors:

- J.A.Kozak\* Northwestern University
- B.G.Lewis Northwestern University

### Abstract:

A one-dimensional biohydrogeological model was developed to describe the movement of two fluid phases, gas and water, within a porous media, and the transport of Rn-222 within and between these two phases. Included in this model is the vegetative uptake of water and aqueous Rn-222 that can be extracted from the soil via the transpiration stream. The mathematical model is formulated through a set of phase balance equations and a set of species balance equations. Mass exchange, sink terms and the dependence of physical properties upon phase composition couple the two sets of equations. Numerical solution of each set, with iteration between the sets, is carried out leading to a set-iterative compositional model. The Petrov-Galerkin finite element approach is used to allow for upstream weighting if required for a given simulation. Mass lumping improves solution convergence and stability behavior. The resulting numerical model was found to produce accurate, mass conservative solutions when compared to published experimental and numerical results and theoretical column experiments.

#### **Corresponding Author Information:**

Barbara-Ann Lewis Northwestern University 2145 Sheridan Road Evanston, IL 60208 phone: 8474914027 fax: 8474914011 e-mail: b-

### **Presentation Information:**

Presentation Date: Wednesday, November 13, 2002 Presentation Time: 1:45 pm

## **Keywords:**

Radon and Radium, Phytoremediation, Solute Transport, Numerical Models