Analysis of the Ra-226/228 Isotope Ratio to Determine the Source of Elevated Radium in the Groundwaters Below an Old Coal Pile

Donna Beals, Bill Winn and Miles Denham
Savannah River Technology Center
Aiken SC 29808

Groundwaters below an old coal pile at the Savannah River Site were found to contain elevated levels of radium. The groundwaters are also highly acidic, have high sulfate levels, and high dissolved Al, Ca, Fe and Mg. In an effort to identify the source of the elevated radium, leaching from the indigenous soil or leaching from the coal with percolation into the groundwater, the isotopic ratio of Ra-226/228 was measured in the groundwater, local soil and coal pile by gamma spectrometry. The Ra-226/228 in the groundwater was determined by counting approximately three liters of water overnight, in a Maranelli beaker, on an 160% high purity germanium detector in the SRTC Underground Counting Facility. The radon background in the UCF was monitored by counting simultaneous backgrounds on other HPGe detectors in the UCF while the water samples were counted. Soil and coal samples were dried and counted in standard sealed geometry counting vials to determine the sample Ra-226/228 activity ratio.