Speciation of Strontium-90 in NIST Natural Matrix Standard Reference Materials

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A sequential leaching, radiochemical separating, and low-level beta-particle counting procedure was designed to study the speciation of radionuclides in natural matrix standard reference materials, SRMs 4350B (Columbia River Sediment) and 4353 (Rocky Flats Soil-1). Strontium-90 is the first radionuclide studied because of the difficulty we have experienced in its natural-matrix SRMs. The nine-step procedure extracted Sr-90 from the following fractions: water solubles, exchangeables, carbonates, reducibles, organics, iron and manganese oxides, acid leachables, micas, and silicates.

The majority of Sr-90 in the soil samples was found in the exchangeable fraction. By contrast, the Sr-90 in the sediment is more evenly distributed among the various leached fractions. Information on the leach distribution of radionuclides in environmental SRMs, based on the procedure described, should lead to more cost-effective restoration strategies and more confidence in risk assessments of human health hazards.