Sorption behaviour of contaminants in soils: pH and humic acid effects on sorption of on CEC of clay soils and minerals, and the mobility of Cd, Cs, Ni and Sr.

Thursday, 22 April 2010 05:00 (15 minutes)

The aim of this study is to use predictive modelling to understand and calculate the sorption behaviour of radionuclide contaminants in complex environments such as clay-based soils. The effects of Natural Organic Matter (NOM) on the Cation Exchange Capacities (CEC) of different characterised clay soils (St Bees & Mercia Mudstones, Boom clay & London clay) and their constituent clay minerals will be determined by 'doping'the samples with varying amounts of purified Humic Acid (not exceeding 15%) and measuring the changes in CEC.

This will be followed by an assessment of how NOM affects the mobility of radionuclides (Cadmium-109, Caesium-137, Nickel-63 & Strontium-85) through the materials using column and batch techniques. The experiments will be repeated with each of the constituent clay minerals (montmorillonite, kaolinite, illite, chlorite & bentonite) present in the soils using batch techniques, and the results obtained used to improve the understanding of the separate effects of each mineral on the overall sorption behaviour of the soils. This will lead to testing to determine if the Additivity Principle holds for these systems.

Radiometric Techniques & Inductively coupled plasma optical emission spectroscopy (ICP-OES) will be employed in the quantification of radionuclide speciation between the phases, and the samples will be characterised by SEM and XRD with the assistance of BGS.

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