170-14 Understanding the Low Arsenic Bioaccessibility in Tailings From a Gold Mining Area.

See more from this Division: S11 Soils & Environmental Quality
See more from this Session: S11 General Soils & Environmental Quality: Metal/Metalloid Interactions in Soil

Monday, October 22, 2012
Duke Energy Convention Center, Exhibit Hall AB, Level 1

Fabio B. Ono[1], *Evanise S. Penido*[1], *Donald Sparks*[2] *and Luiz-Roberto G. Guilherme*[1], *(1)Federal University of Lavras, Lavras, Brazil*
(2)University of Delaware, Newark, DE

Studies have shown the presence of high concentrations of trace elements (e.g. arsenic−As) in soils and tailings from gold mining areas worldwide. Arsenic pollution in natural environments has become a critical problem across the world due to its high risk to human health. High levels of total As (262 to 2666 mg kg^{-1}) were measured in tailings from a gold mining area of Brazil. At the same time, the As bioaccessibility was very low (<4%). Knowing the chemistry of fractions associated with As could help to explain As bioaccessibility in the samples. The aim of this study was to determine the As fractions in samples of substrates/tailings from a gold mining area located in Brazil and assess the As oxidation state. Samples were collected at depths of 0-2 and 2-10 cm in three subareas (Exp. B1, B1 and Undisturbed material) and a depth of 0−20 cm in the tailings pond. The chemical forms of As in the samples were measured using a sequential extraction protocol. Non-specifically adsorbed As (1), specifically adsorbed As (2), amorphous and poorly crystalline Fe and Al hydrous oxide-bound As (3), well-formed crystalline Fe and Al hydrous oxide-bound As (4), and residual phase (5) were selectively and sequentially extracted. Bulk XANES/EXAFS analyses were used to evaluate the As oxidation state and its chemical binding. Sequential extraction showed that the majority of As in the samples was bound to crystalline Fe oxides (53 to 87%), except for the tailing sample, where the As was bound to the residual phase (73%). Arsenic was predominantly present as the As(V) species, with As-O, As-Fe, and As-Ca binding present. This study confirmed the results of low percentages of bioaccessible As obtained in a previous study, verifying the crucial role of Fe oxides in immobilizing high amounts of As in superficial environments. Sponsored by CNPq and FAPEMIG.

See more from this Division: S11 Soils & Environmental Quality
See more from this Session: S11 General Soils & Environmental Quality: Metal/Metalloid Interactions in Soil

<< Previous Abstract | Next Abstract >>