

In-situ speciation of arsenic contaminated soil using micro-focused x-ray fluorescence and x-ray absorption fine structure spectroscopy. (S02-grafe227045-oral)

Authors:

- M. Grafe* - *Univ. of Delaware*
- M.A. Marcus - *LBNL - Advanced Light Source*
- D.L. Sparks - *Univ. of Delaware*

Abstract:

Two depth increments (LM-A, 0-20 cm; LM-B, 20-40 cm) of a mixed metal-arsenic contaminated soil from a former copper chromated arsenate facility were investigated using *f*YXRF and *f*YXAFS spectroscopy to assess the role of the co-contaminating metal cations (Cu, Zn, & Cr) in the solid phase speciation of arsenic. Elemental maps from *f*YXRF analysis showed strong spatial correlation between As and Cr (~ 90%), Cu (~ 75%), and Zn (greater than 90%). Arsenic K-edge *f*YXAFS showed that As was dominantly in the +5 redox state with trace amounts of As (III) observable in some places. The extended *f*YXAFS data, analyzed using principal component and linear least-squares combination fit analysis, suggested two to three principal components necessary to reconstruct each data set. Target transformation of the principal components subsequently identified CuAs and CuZnAs bearing reference spectra. Linear least-square fit analysis revealed that in LM-A mixed CuZnAs precipitates accounted for ca. 75% of the As solid phase compositions, while in LM-B the fraction of mixed CuZnAs precipitates dropped to 37% and the fraction of CuAs precipitates rose from 19 (LM-A) to 44%. The data of this study show that As solid phase speciation is dependent on the co-contaminating metal cation fraction.

Speaker Information: Markus Grafe, Univ. of Delaware, Dep. PLSC152 Townsend Hall University of Delaware, Newark, DE 19717; Phone: 302.831.1595; E-mail: mgrafe@udel.edu

Session Information: Monday, November 3, 2003, 1:55 PM-5:20 PM

Presentation Start: 3:15 PM

Keywords: soil contamination; arsenic speciation; micro-focused XRF/ XAFS; PCA/ LCA