

**Tuesday, 8 November 2005**  
**171-2**

*This presentation is part of: Symposium--Revisiting Metal Behavior in Biosolids Amended Soils: Applying Knowledge Gained to an Understanding of Behavior of Metals in Soils Systems: III*

## **The Plant-Soil Interface: Soil Nickel Speciation and the Mechanisms of Nickel Hyperaccumulation.**

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We determined the effect of soil type (organic vs. loam) and liming on Ni speciation in soils surrounding an historic Ni refinery and the influence of this speciation on Ni availability, translocation and storage in the Ni hyperaccumulator *Alyssum murale*. Using a combination of analytical methods including SEM, micro-XAFS and SXRF we found NiO, a direct byproduct of the refining process, present as discrete, spherical particles throughout all of the soil types and treatments. Micro-XAFS enabled us to probe beyond the obvious NiO particles which revealed that Ni was present as organic complexes in the organic soils, while in the loam soils Ni/Al layer double hydroxide (LDH) and to a lesser extent Ni(OH)<sub>2</sub> phases existed. There was little evidence for a significant effect of liming on Ni speciation. This is the first study to directly identify LDH phases in whole, anthropogenically enriched soils. It is hypothesized that the more soluble Ni species released from the refinery have since redistributed into organically complexed phases (organic soils) or as secondary precipitates (loam soils) while the more resistant NiO particles persist. We then determine the Ni compartmentalization, and identity of ligands responsible for Ni transport and storage in the Ni hyperaccumulator *Alyssum murale* after which we discuss the connection between soil Ni speciation and bioavailability.