Experience with alternative leaching protocols for mercury-bearing waste

F. Sanchez[1], D.S. Kosson[1], C.H. Mattus[2] and M.I. Morris[2].

[1] Department of Civil and Environmental Engineering, Vanderbilt University
[2] Nuclear Science and Technology Div., Oak Ridge National Laboratory (ORNL)

A new framework for evaluating leaching of constituents of potential concern from wastes will be presented and illustrated for assessing the efficacy of potential treatment process for mixed wastes (radioactive and hazardous) that contain mercury. This framework is based on the measurement of intrinsic leaching properties of the material of concern. Test results are applied in conjunction with assumed management scenarios and mass transfer models to estimate release of constituents of potential concern over a defined time period. The specific objectives of this talk will be to (i) describe specific testing protocols and interpretation approaches of the framework and (ii) show how the integrated use of equilibrium and mass transfer leach tests in conjunction with appropriate mass transfer models can provide more realistic release estimates for direct comparison of different treatment processes and evaluating potential impact from different management scenarios.

Two mercury-contaminated soils (*ca*. 4500 mg/kg) and four candidate treatments will be examined. The four candidate treatments are: vacuum thermal desorption, encapsulation and amalgamation with sulfur polymer cement, and two forms of solidification/stabilization. Mercury solubility as a function of pH and mercury release rate will be discussed. Mercury release estimates for percolation and mass transfer controlled scenarios will be compared to release estimates based on total content and Toxicity Characteristic Leaching Procedure (TCLP) results. Finally, probability distributions for 100-year mercury release estimates will be examined in the context of three disposal scenarios (i.e., municipal waste landfill, hazardous waste landfill and industrial co-disposal landfill).