

Overview/Update Regarding LEAF Methodology and its Application to Beneficial Use in the United States and Europe

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Abstract

An integrated Leaching Environmental Assessment Framework (LEAF) is being developed and implemented in the United States with close coordination and parallel development in the European Union. LEAF provides a basis for evaluating remediation, beneficial use and disposal options for a wide range of materials including residuals from energy production, industrial processes and contaminated soils. LEAF evaluates leaching behavior of materials using a tiered approach that considers pH, liquid-to-solid ratio (L/S), and waste forms across a range of field conditions. Implementation of LEAF includes development and validation of leaching test methods, data management tools, and scenario-based assessment in the context of prior information and using percolation and diffusion mass transfer models. Chemical speciation and reactive transport modeling can be used to evaluate field conditions beyond laboratory testing. The LEAF leaching test methods have undergone required inter-laboratory precision and repeatability testing and are now included in SW-846, a compendium of EPA methods to evaluate the physical and chemical properties of wastes and secondary materials. Recently, EPA has published guidance for decisions regarding beneficial use of coal combustion residues for encapsulated uses. Further guidance on use of LEAF is under development. In CEN (European standardization organization) leaching tools very similar to the methods now adopted by US EPA have been developed for Waste (TC292), Soil (TC345) and Construction Products (TC351). In the case of waste these methods were used to develop the EU Landfill criteria. They are now in discussion in relation to an update of the Hazardous waste classification, in particular to concerns in relation to residues from thermal processes, which are still judged based on their total content. They are crucial in the ongoing discussions related to End of Waste criteria. In the case of construction products (Construction Products Regulation – CPR), the dynamic tests – percolation and monolith leaching – are being standardized as EU wide regulatory tools to be referenced in individual member State regulations. Unfortunately, the most crucial tool for long term impact assessment (pH dependence test) is not part of the toolbox yet.