The Leaching Environmental Assessment Framework as a Tool for Evaluating Release from Coal Combustion Residues

Andrew C. Garrabrants[1], David S. Kosson[1], Rossane C. DeLapp[1], Susan A. Thorneloe[2], Greg Helms[3], Mark Baldwin[3], and Peter Kariher[4]

[1]Vanderbilt University, Civil and Environmental Engineering, VU Station B 351831, Nashville, TN 37235; [2]U.S. Environmental Protection Agency, National Risk Management Research Laboratory, Research Triangle Park, NC 27711; [3]U.S. Environmental Protection Agency, Office of Resource Conservation and Recovery, Washington, DC 20460; [4]ARCADIS-US, Inc., Durham, NC 27713

KEYWORDS: environmental assessment, leaching tests, LEAF, coal combustion residues, utilization

ABSTRACT

Rigorous environmental assessment approaches incorporating current science are most useful in supporting environmentally-sound decisions regarding the management of coal combustion residues (CCRs). The current leaching tests, commonly applied to CCRs, offer limited evaluation through simulation of a single leaching scenario and do not provide the mechanistic understanding required to fully evaluate treatment techniques or utilization scenarios. The Leaching Environmental Assessment Framework (LEAF) consists of leaching test methods, data management tools and release evaluation approaches that, when integrated, offer a comprehensive and transparent leaching assessment approach. LEAF was developed through an international collaboration with EPA guidance to define a leaching evaluation approach which more accurately delineates the source of release for a wide range of solid materials including CCRs.

Leaching characterization under LEAF is used to determine material-specific leaching properties as a function of key release controlling factors (e.g., pH, liquid-sold ratio and rate of release) over a broad range of test conditions that also cover the range of plausible management conditions. The four leaching tests within LEAF are currently undergoing inter-laboratory validation and review for potential inclusion into EPA's SW-846. Material-specific leaching characterization may be applied to site- or scenario-specific release conditions in order to provide an estimate of contaminant release to the environment. This presentation will provide an overview of LEAF in context with current leaching approaches and demonstrate how integration of leaching test results with scenario-specific data may be used for assessment of CCRs.

Submitted for consideration in the 2011 World of Coal Ash Conference,

May 9-12, 2011.