"Historically, single-point pH leaching tests have been used to support CCR management decisions. The U.S. EPA's Science Advisory Board and the National Academy of Sciences raised concerns over the use of single-point pH tests that do not reflect the actual conditions under which CCRs are typically managed. Because metal leaching rates change with changing environmental conditions (especially pH), the concern is that the existing leach tests being used for CCR management decisions may not be the most accurate predictor of potential environmental release of mercury or other metals. In response to these concerns, the U.S. EPA is using a more comprehensive leach testing framework to investigate the potential for leaching of mercury and other metals from CCRs over the range of field conditions to which CCRs are typically exposed to during land disposal and in engineering and commercial applications." Senior, C.L., Thorneloe, S., Khan, B., and Goss, D. ***Fate of Mercury Collected From Air Pollution Control Devices***. *Air And Waste Management Magazine*, July, 2009.

An Integrated Framework for Evaluating Leaching in Waste Management and Utilization of Secondary Materials. Kosson, D.S., van der Sloot, H.A., Sanchez, F. and Garrabrants, A.C.. *Environmental Engineering Science* 19(3):159-204. 2002.

"The framework includes different test methods that consider: (i) pH and LS (liquid-to-solid ratio) dependent leaching, (ii) percolation-based release using column testing, and (iii) diffusion-limited release from monoliths and compacted granular materials that behave as monoliths after placement. Public release of the draft methods is planned for fall 2009 as SW-846 Draft Methods*." Senior, C.L., Thorneloe, S., Khan, B., and Goss, D. ***Fate of Mercury Collected From Air Pollution Control Devices***. *Air And Waste Management Magazine*, July, 2009.

Major Findings from Report 1 on Sorbents for Enhanced Mercury Capture

- Mercury is strongly retained by the resulting CCR and unlikely to be leached at levels of environmental concern.
- Arsenic and selenium may be leached at levels of potential concern both with and without enhanced mercury control technology.
  - Highest As leach values at 20% of toxicity characteristic (TC).
  - Highest Se leach value is 10 times the TC.
- Leachate concentrations and the potential release of mercury,arsenic, and selenium do not correlate with total content.
- Laboratory leach data compares very well to field leach data.

Improved Leach Testing to Evaluate Fate of Hg and other Metals from Management of Coal Combustion Residues, Susan Thorneloe, USEPA Office of Research & Development, December, 2008.

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Results for Leach Testing Analysis for Coal Fly Ash From Six Facilities Using Sorbents for Enhanced Hg Capture

(Published in EPA/600/R-06/008, Feb 2006)

	Hg	As	Se
Total in Material (mg/kg)	0.1 -1	20 - 500	3 - 200
Leach results (ug/L)	Generally 0.1 or lower	<1 - 1000	5 – 10,000
MCL (ug/L)	2	10	50
TC (ug/L)	200	5,000	1,000
Variability relative to pH*	Low	Moderate to High	Moderate

MCL - Maximum concentration limit (for drinking water)

TC - Toxicity Characteristic – Threshold for hazardous waste determinations

***Variability defined as-**
low - <1 order of magnitude difference
med - 1 to 2 orders of magnitude difference
high - >2 orders of magnitude difference