Quantitation and Interpretation of Release of Mercury from Coal Utilization By-Products

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ABSTRACT

Mercury emission control technologies have the potential to impact existing coal utilization by-products (CUBs) produced at coal-fired power plants. The CUBs most likely to be affected are the fly ash or flue gas desulfurization (FGD) materials. The mechanisms that may allow mercury to be released under typical management scenarios are leaching—both direct and microbiologically mediated—and vapor release, ambient temperature release, elevated temperature release, and microbiologically mediated release.

In order to evaluate the potential for mercury release from CUBs associated with those mechanisms, the Energy & Environmental Research Center has developed experimental protocols to simulate conditions that would allow mercury releases from CUBs to be measured in a controlled laboratory setting. Release data have been generated on fly ash and FGD material from existing systems and systems where mercury control technologies were being demonstrated. Results to date indicate that direct leaching of mercury is very limited regardless of the leaching method used, and no correlation has been noted between the total mercury content of a CUB and the leachate concentrations. Results of ambient temperature release experiments indicate that most CUBs act as mercury sinks rather than releasing mercury. Results of elevated temperature release of mercury indicate that at least some mercury remains associated with the CUB even after exposure to temperatures up to 700°C. Preliminary results from microbiologically mediated release experiments indicate that organomercury compounds have been identified and quantitated in both the vapor releases and the leachate.

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