State of Wisconsin
Department of Administration
Division of Energy

Environmental Research Program

Executive Summary

September 2005

Characterization of Mercury in Coal Combustion Products Generated in Wisconsin

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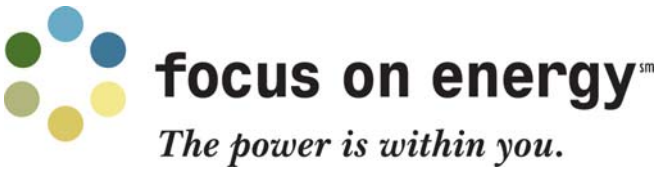
This report in whole is the property of the State of Wisconsin, Department of Administration, Division of Energy, and was funded through the FOCUS ON ENERGY program.



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Mercury in coal combustion products (CCPs) produced in Wisconsin was evaluated by collecting solid ash samples from power plants and field leachate samples from CCP landfills. The samples were analyzed for total mercury concentration, volatilization, and speciation of dissolved mercury. The overall results suggest that mercury is stable with respect to leaching and volatilization in the fly ash currently produced.

Field sampling found that concentrations of dissolved mercury are very low in leachate at CCP landfills in Wisconsin, usually less than 50 ng/L. The dissolved mercury concentrations were all well below the Wisconsin Preventative Action Limit for groundwater (200 ng/L). Concentrations of the more toxic organic mercury species, methyl mercury, were less than 1 ng/L in all ten field leachate samples in which it was analyzed. Given these extremely low concentrations, and the low mobility of mercury in groundwater, there is little threat of impacts to groundwater from mercury at existing CCP sites in Wisconsin.

Field and laboratory flux testing was performed to evaluate the potential for volatilization of mercury from the fly ash to the atmosphere in the landfill environment. Factors controlled in the laboratory studies included light, temperature, and moisture. Results indicated that fresh fly ash (collected from the hoppers) generally sorbs mercury from the ambient air. Field tests were carried out continuously over a one week period to allow for a wide range in natural environmental conditions. The field study confirmed the laboratory results, indicating little net gain or loss of mercury from CCPs due to exchange with the atmosphere over the one week period.

Changes in emissions controls that may impact the release behavior of mercury are enhanced mercury capture using activated carbon injection (ACI), and ammonia addition for NOx control. Testing of ash from an ACI demonstration project at a Wisconsin power plant indicated that while the total mercury concentration in the fly ash will increase, leaching and volatilization are still very low. Ammonia-based NOx controls have the limited potential to increase mercury leaching and mobility due to complexation, but only at very high ammonia levels (>1,000 mg/L) and in a narrow pH range between 8 and 9.

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This document describes research sponsored by EPRI and Wisconsin Focus on Energy
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