

Methyl Mercury Contamination of River Sediments Near the Coal Ash Spill at the Kingston Fossil Plant, TN

Amrika Deonaraine¹, Heileen Hsu-Kim¹, Laura Ruhl², Avner Vengosh², Gideon Bartov³, Thomas M. Johnson³

¹Duke University, Civil & Environmental Engineering, Durham, NC 27708; ²Duke University, Division of Earth and Ocean Sciences, Durham, NC 27708; ³University of Illinois at Urbana-Champaign, Department of Geology, Urbana, IL 61801

The presence of mercury in coal combustion products (CCP) is a growing concern, particularly with the development of air pollution control technologies that concentrate the metal on CCP wastes. Mercury that is associated with this material would be a problem if converted by anaerobic microbes to methylmercury, the toxic species that bioaccumulates in aquatic food webs. In this study we investigated the occurrence of methylmercury (MeHg) in river sediments inundated by the largest coal ash spill in US history at the Tennessee Valley Authority (TVA) coal-fired power plant in Kingston, TN. In the Emory River near the spill, total Hg in the sediments was 0.11 ± 0.03 mg/kg, greater than the Hg content of sediments upstream of the spill (0.06 ± 0.03 mg/kg). Further downstream of the spill in the Clinch River, average Hg content in sediments was greater (0.86 ± 0.36 mg/kg), probably due to historical contamination from the Oak Ridge area. MeHg concentrations in the river sediments varied spatially and temporally and were generally unrelated to total Hg content. The percentage of mercury as MeHg was largest at locations in the Emory River near the coal ash spill site and lowest in the historically contaminated Clinch River, indicating that conditions in the Emory River were amenable to MeHg production. Furthermore, Hg isotope data suggest that much of the mercury near the spill site in the Emory River was derived from coal ash. Thus, higher relative MeHg levels could be due to stimulation of biomethylation from coal ash in the sediments or conditions in the Emory River that favor MeHg production. The coal ash material was a source of leachable sulfate to river sediments and may have stimulated growth of sulfate-reducing bacteria that produced the methylmercury. Our results highlight the need to consider methylation potential and bioavailability to MeHg-producing bacteria when evaluating the hazards of CCPs with respect to mercury.

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