Measurement of Mercury Flux from a River Bank Environment

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The interaction between the bank and channel in river systems is an important factor in mercury behavior in these - systems. The channel system has different physical and chemical environments which can have an impact on mercury mobility and its chemical transformation. Most notably, the formation of methylmercury, a more toxic form, can be increased in the channel sediments, when compared to the bank system. An increase in methylmercury can lead to increases in bioacculumation in biota. Mercury in the river channel is also more susceptible to movement by advection, increasing the mercury impacted area.

In order to understand how the complex interactions between the bank and channel systems influence mercury behavior, a variety of parameters were examined at a mercury impacted site, the South River (Waynesboro, VA, USA.) Sampling of the bank soil and channel sediment for mercury was conducted. Groundwater fluxes were measured using pressure transducers in monitoring wells in the bank environment. Continuosly sampling probes were also used to measure groundwater redox conditions in the bank environment. Passive samplers -Diffuse-gradient in gel-thin film (DGT) devices - were used to measure the dissolved mercury and methylmercury in the bank and channel sediment. Cyclic voltammetry was used to measure dissolved redox sensitive species, such as oxygen, iron, manganese, and sulfate, in the channel and bank.

A better understanding of the role of groundwater in the flux of mercury from the bank to the channel will have an impact on potential remedies. If bank erosion is the primary driver of mercury flux into the channel, bank stabilization will significantly reduce risk. However, if the groundwater contributes significantly to the mercury flux, other remedation strategies will need to be explored. Understanding of these systems will contribute to a better overall site conceptual model.