Sulfate From Mines and Effect on MeHg Transport in the St. Louis River Watershed, NE Minnesota

MICHAEL E. BERNDT[1] AND JEFF JEREMIASON[2]

[1]Michael E Berndt, Mn Dept. of Natural Resources, St. Paul, MN, 55155 mike.berndt@state.mn.us

[2]Gustavus Adolphus College, Dept. of Env Studies, St. Peter, MN, 56082 jjeremia@gustavus.edu

The St. Louis River watershed is the site of a large iron mining district where water containing between 50 and 1000 mg/l sulfate is pumped continuously into the headwater regions of a river that eventually feeds into Lake Superior. In this study, thirty-three water samples were collected from the St. Louis River at three sites located upstream and downstream from a series of confluences with mining tributaries during the 2012 spring and summer seasons, which ranged from unusually wet to unusually dry. Hundreds of dragonfly larvae were also collected from the watershed in the autumn and analyzed for MeHg.

Principal component analysis revealed that THg, MeHg, Fe, and DOC were essentually unrelated to magnesium and sulfate concentrations (See figure below). While magnesium and sulfate were derived mostly from the mines, THg, MeHg, and Fe were principally transported along with DOC from non-mining portions of the watershed. MeHg concentrations in *Aeshnid*ae dragonfly larvae collected in the autumn was positively correlated (R = 0.866, p=0.001) to peak MeHg concentrations in the dissolved phase measured during June and July. MeHg in dragonfly larvae were not elevated at the highest sulfate sites, but rather the reverse was generally observed. MeHg in the water was the best predictor of MeHg in dragonfly larvae leading to the conclusion that MeHg in water from previous studies is a reasonable indicator of methylmercury contamination in biota in these systems. Record rainfall events in 2012 likely delivered the majority of Hg and MeHg to these systems via interflow resulting in minimal impact observed due to sulfate released in 2012 due to mining activities.