

Dr. Elizabeth Herndon, Assistant Professor in the Department of Geology at Kent State University completed an Ohio Water Resources center funded project through the Ohio Water Development Authority subaward. The project, “**Concentration-discharge behavior of dissolved and particulate metals in a mining impacted stream,**” examined metal dynamics in the Huff Run watershed, an AMD-impacted watershed in northeast Ohio. Evaluating the relationship between discharge and metal transport at Huff Run will enable responsible parties to assess the long-term economic benefits and viability of stream restoration projects.



The HR25 tributary in the Huff Run Watershed is relatively pristine above a beaver dam (the grassy area in the middle of the photo) but receives inputs of AMD-contaminated water below the beaver dam (left of photo).

ephemeral tributary to the stream and control concentration discharge behavior at the stream outlet. Overall, the treatment system effectively neutralized acidity and reduced contaminant loads in the tributary, but only under high flow conditions. In the stream, the base cations and sulfate behaved chemostatically when exiting the catchment while AMD-derived metals (Fe, Mn, Al) showed dilution behavior. Chemostatic behavior was explained by the mixing of chemically similar waters. Particle transport increased at high discharge, possibly due to scouring of iron oxides from the stream bed during high flow conditions (Figure right). This study highlights both the significance of metal speciation with regard to watershed export of contaminants, and flow conditions with regard to treatment design and the necessity to examine the hydrology of the area further to create treatment systems.

Researcher profile: Dr. Elizabeth Herndon is an environmental geochemist, with research interests that includes the interaction between minerals, water, and biota with a focus on human perturbation of the environment through changes in land use.

Acid mine drainage is a common cause of water impairment in eastern Ohio and the Appalachian coal region. Huff Run watershed is an example of an area with reduced water quality due to AMD (photo left). Oxidic limestone treatment has decreased some of the stream acidity, but parts the stream stay impaired. Dr. Herndon and her students installed velocity meter on small tributary to Huff Run and collected water samples during the storms and dry weather to evaluate dissolved and particulate metals and other anions. They determined that limestone constructed treatment system can act as

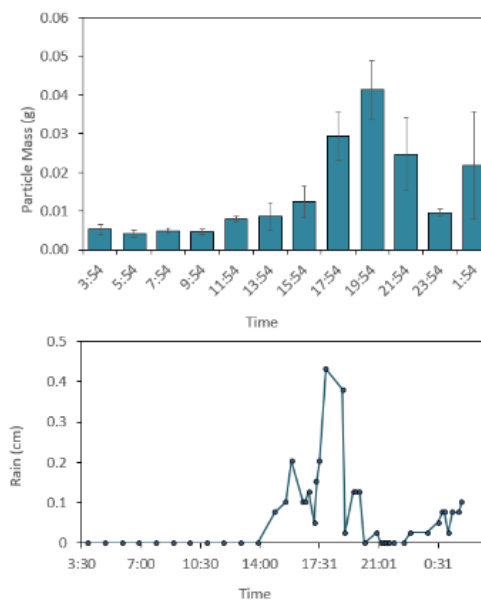


Figure 5. (top panel) Particle mass contained within 60 ml of stream water collected once every two hours by the ISCO autosampler and injected into the gravity filtration system. (bottom panel) Rainfall recorded during the storm event.