Katharine L. Schleich
Ohio University Department of Geological Sciences
Clippinger Laboratories Room 316
Athens, OH 45701
Ks471712@ohio.edu
614-202-1659

TITLE: Modeling precipitation of minerals and water chemistry evolution in an acid mine drainage remediated stream

AUTHORS (FIRST NAME, LAST NAME): Katharine L. Schleich[1], Dina L. Lopez[1], Jennifer R Bowman[2], Natalie A Kruse[2], Amy L Mackey[3], Darcy VanDervort[3], Rebekah Korenowsky[3]

INSTITUTIONS: 1. Geological Sciences, Ohio University, Athens, OH, United States. 2. Voinovich School of Leadership and Public Affairs, Ohio University, Athens, OH, United States. 3. Raccoon Creek Partnership, Ohio University, Athens, OH, United States

ABSTRACT: Hewett Fork, located in the Raccoon Creek watershed in Southeastern Ohio, is impacted by acid mine drainage (AMD) from the AS-14 mine complex in Carbondale, Ohio. In attempts to remediate the stream, the water is being treated with alkaline input from a calcium oxide doser. While the section of watershed furthest downstream from the doser is showing signs of recovery, the water chemistry and aquatic life near the doser are still impacted. The objective of this study is to examine and model the chemistry of the tributaries of Hewett Fork to see the contributions to the alkalinity and acidity budgets of the main stem of the stream. By examining the inputs of tributaries, the project aims to understand processes occurring during remediation throughout the entire stream system. Chemical analysis of water and sediment samples, XRD identification of minerals and geochemical modeling using the PHREECI program have been applied to understand the chemical processes happening throughout the watershed. Results of the modeling and sediment XRD show that the minerals ferrihydrite, goethite, calcite, diaspore, gibbsite and gypsum form when the acidic waters from AMD sources mix with CaO in equilibrium with CO_2 and O_2 in the air, transferring the contaminants from the water to the sediments. Downstream from the doser, along the main stem, the formation of the minerals diaspore, ferrihydrite, gibbsite, and goethite are observed when the evolution of the water is modeled and compared with the XRD results and sediment chemistry. While the precipitation of these minerals contributes to improvements in water chemistry, the deposition of metals inhibits biological recovery downstream of the doser. When examining the recovery of acid mine drainage remediated streams, the inputs of contaminants, the transport of sediments, and the complex reactions between the water and sediments need to be considered together to understand habitat improvements.