

Understanding Storm Response of AMD Impacted Streams

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Abstract: Limited biological recovery in acid mine drainage (AMD) impacted streams may be due in part to a flushing response caused by rainfall events due to the transport of accumulated AMD reaction products that go partially untreated, causing a decline in water quality of the stream. This study examines the changing geochemical environment during precipitation events in the Hewett Fork watershed, in Athens County, Ohio. Three sampling sites along Hewett Fork were selected to deploy data logging equipment to log water chemistry. The most impaired site, HF129, was situated just downstream of an active treatment system discharge; here the data logger collected depth, temperature, and conductivity. The next site downstream, HF090, is where some biological recovery can be found, and the furthest downstream site, HF039, is where the stream meets both chemical and biological metrics. At the latter two sites the data loggers recorded pH, temperature, conductivity, total dissolved solids, and oxidation-reduction potential. During large storms, water samples were collected once an hour for 24 to 48 hours using auto-samplers at HF090 and HF039. The collected samples were then analyzed for total acidity, total alkalinity, sulfate, and a large suite of cations, including Al, Fe, and Mn. Flow measurements were collected during various flow regimes to help correlate the discharge to measured water depth. The results suggest that storm events occurring under high flow conditions are more critical to the chemical conditions than expected. While storm events during the low flow of summer did not lead to episodic degradation of water quality. Inputs from downstream tributaries and groundwater sources within the watershed are shown to be contributing additional alkalinity during storm events, which may buffer the storm effect during low flow conditions of summer. This study supports the importance of measuring the variation of chemistry during storm events.

Additional Key Words: Episodic events, Auto-samplers, Rainfall, Flushing response