

EVOLUTION OF THE CHEMICAL COMPOSITION OF WATER AND SEDIMENTS IN A LAKE AFFECTED BY ACID MINE DRAINAGE

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Sandy Run (Vinton County, Ohio) is a stream receiving acid mine drainage (AMD) from an abandoned coal mine complex. This stream has been dammed to form Lake Hope. Profiles of temperature, pH, and dissolved oxygen at different times of the year do not show the typical seasonal stratification observed in temperate lakes. Cross-sections of these parameters along the lake show vertical isotherms and lines of equal concentration. This behavior reflects the input of acidic and cold (winter) or hot (summer) water from Sandy Run. pH increases and TDS decreases along the water path. Alkalinity titrations along the lake show that the rise in pH is likely to be produced by the input of alkaline groundwater. The sediments show lower concentration of heavy metals close to the AMD discharging point and higher concentrations in the deeper region, close to the dam. Several mechanisms are suggested to explain this behavior: 1) During storm events, heavy metals and sediments from the AMD source could be transported to regions of lower water velocities (dam) and stored at the bottom. 2) Sediments rich in heavy metals could be eroded from sedimentary rocks surrounding the lake and transported to the lake. 3) The water current to the region close to the dam transports algae growing in the lake. These algae could be collecting the heavy metals from the water and transporting them to the dam region, where they accumulate after they die. A combination of these processes is likely to produce the observed chemistry.