

Many miles of streams in the U.S. (and worldwide) are contaminated by mine-drainage originating from both active and abandoned mining sites [coal and metal mining]. Depending on the host-rock, the drainage might or might not be acidic. Once the drainage mixes with oxygenated stream water, changes might include a decrease in the stream water pH, oxidation of metal ions, precipitation of metal oxyhydroxides, and/or co-precipitation/sorption of metals to precipitates. These particles can settle to the streambed or be transported further downstream to later aggregate and settle. Streams affected by mine-drainage are typically devoid of aquatic life due a number of factors, including toxic levels of metals, reduced pH, and reduction in available oxygen to benthos by armoring and filling in of spaces between rocks with sediment from settled precipitates and sedimentation from erosion of waste rock and/or tailings. Active and passive treatment options exist for remediation of mine-drainage; the choice is a function of many variables, including cost, available space (land), and specific contaminants and their concentrations. Active treatment involves the use of chemicals to neutralize acidity and to precipitate metals. Passive treatment involves the use of technologies that require little or no monitoring or maintenance over long periods (months, years, decades). Semi-passive treatment requires some monitoring and/or maintenance, but much less than that required by active treatment. Examples of passive/semi-passive treatment include wetlands (aerobic and anaerobic), biochemical reactors (generally anaerobic), alkalinity producing systems, and permeable reactive barriers.