

EXPANDING THE SCOPE OF PASSIVE TREATMENT: CO-TREATMENT OF ACID MINE DRAINAGE WITH MUNICIPAL WASTEWATER¹

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Abstract: The passive co-treatment of acid mine drainage and municipal wastewater has been recently shown to be feasible in multiple laboratory studies which emulated field conditions with synthetic and genuine high-strength raw effluent sources from North and South America. Results have shown that passive co-treatment can efficiently address waters beyond the recommended parameters (e.g., acidity, pH, metals concentrations) for conventional passive treatment. Experiments have demonstrated highly efficient treatment of most of the constituents of concern in acid mine drainage and municipal wastewater (e.g., >80% reduction in Al, As, Cd, Fe, Pb; production of net-alkaline circumneutral pH effluent; thorough removal of biochemical oxygen demand and phosphate; 100% reduction in fecal indicator bacteria). Passive co-treatment presents an opportunity to use wastes as resources to improve water quality with minimal use of fossil fuels and refined materials. However, further field and laboratory research is needed on various fronts. Questions remain on the mechanisms of passive co-treatment (e.g., low-pH sulfate reduction, iron reduction, phosphate sorption, oxygen stripping) and the nature of the solids produced (i.e., composition, structure, stability). In addition field pilot studies are needed to establish suitable design guidance (e.g., determination of suitable loading rates, temperature effects, solids handling methods, metals reclamation options, mixing ratios, etc.).

Additional Key Words: Aqueous geochemistry, ecological engineering, sustainability

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