

SEASONAL AND LONG-TERM PERFORMANCE OF ALKALINITY-PRODUCING PASSIVE SYSTEMS FOR THE TREATMENT OF MINE DRAINAGE

by

George R. Watzlaf¹

Abstract. Eight passive treatment systems, located in Pennsylvania and Maryland, have been intensively monitored for up to seven years. Influent and effluent water quality data from ten anoxic limestone drains (ALDs) and five reducing and alkalinity producing systems (RAPS) has been analyzed to determine seasonal and long-term performance for each of these specific unit operations. The water quality data was also analyzed to determine the performance of each of the eight complete passive treatment systems. The generation of alkalinity in ALDs has not exhibited significant seasonal variations. ALDs that received mine water containing less than 1 mg/L of both ferric iron and aluminum have continued to produce consistent concentrations of alkalinity since their construction. However, an ALD that received 20 mg/L of aluminum experienced a rapid reduction in permeability and failed within five months. The generation of alkalinity in the RAPS has displayed seasonal variations, with significantly more sulfate reduction occurring in the warmer months. Most of these RAPS have been recently constructed, however, one system has been monitored for over six years. A gradual decline in the generation of alkalinity has been observed in this system which can be attributed to a decrease in sulfate reduction rates.

Additional Key Words: passive treatment, anoxic limestone drains, wetlands, sulfate reduction, successive alkalinity-producing systems, acid mine drainage.

¹George R. Watzlaf, Environmental Engineer, Federal Energy Technology Center, U.S. Department of Energy, Pittsburgh, PA 15236-0940.