PRODUCT DESCRIPTION

This report summarizes the history and results of the Albright passive treatment system, which has been in continuous operation for 19 years and undergone two major upgrades to incorporate new passive technologies. The system treats alkaline coal combustion byproduct leachate from a closed disposal landfill. Monitoring parameters have included pH, alkalinity, acidity, aluminum, iron, manganese, nickel, zinc, TDS, and TSS, along with several other trace metals present at very low concentrations. Topics discussed include system performance and removal rates by operational phase, implications for design and sizing of future systems, construction and maintenance costs, and long-term operational and maintenance needs for constructed wetlands and manganese-oxidizing bacteria beds (MOBs).

Results & Findings

Progressive addition of new technologies and design approaches resulted in the Albright system achieving discharge goals for all parameters in its final configuration. Performance results show that contaminant removal rates in constructed wetlands and MOBs are directly related to influent parameter concentrations by rate constants, rather than being fixed values as was assumed in earlier passive system designs. A component sizing approach using this relationship is presented, and preliminary rate constants are provided for aluminum, iron, manganese, nickel, and zinc removal. This approach can allow more accurate system sizing to meet specific contaminant reduction goals. Guidelines are also provided for maintaining constructed wetlands and MOBs to extend their operational lives.

Challenges & Objectives

Although there have been numerous successful projects to date, passive treatment is still largely an emerging technology. The objective of the Albright project was to achieve compliance, test new technologies, and monitor their long-term performance in order to improve design standards for constructed wetlands and MOBs. This report would be of interest to passive treatment system designers, system operators, and environmental managers responsible for compliance management of wastewaters.

Applications, Values & Use

The Albright results are applicable to alkaline wastewaters, or acidic wastewaters than receive neutralizing pre-treatment, with metals concentrations in the general range observed for the Albright site. This information is valuable for expanding the pool of data from practical applications of passive treatment, and will be useful in guiding the analysis of data from other passive projects for rate constant sizing criteria.