ABSTRACT

Closure technologies applied to mining components and environmental liabilities (PAM) in Peru are currently in the research and implementation phase. Therefore, it is necessary to promote initiatives for the application of new technologies that address current PAM issues and can be utilized in mines undergoing final closure. For this reason, the present study aimed to evaluate the removal efficiency of As, Cd, Fe, and Mn from the effluent of the Casapalca 7 Mining Unit through a combined treatment system consisting of a surface flow constructed wetland followed by a limestone bed. The research was conducted between March and June 2022 at the facilities of the Casapalca 7 Mining Unit. A wetland was constructed using organic soil from one of the mine tailings ponds as the substrate, along with the plant Stipa Ichu, found around the sedimentation pond, as a phytoremediation species. The treatment was complemented with a limestone bed to enhance manganese removal. The study was divided into three stages : construction, commissioning, and continuous flow operation. Samples were collected to analyze field parameters such as temperature, ORP, dissolved oxygen, and pH. For total metal concentration analysis, samples were sent to an accredited laboratory. At the beginning of the pilot system operation stage, the influent had concentrations of 0.01092 mg/L arsenic, 1.02990 mg/L iron, 1.65449 mg/L manganese, and 0.00342 mg/L cadmium. At the end of the operation stage, the treated effluent presented concentrations of 0.00771 mg/L arsenic, 0.1456 mg/L iron, 0.02950 mg/L manganese, and 0.00208 mg/L cadmium. By the end of the study, removal efficiencies of 38% for arsenic, 82% for iron, 70% for manganese, and 22% for cadmium were achieved. These results demonstrated that the constructed wetland substrate, the Stipa Ichu species, and the limestone bed worked together to enhance the removal of As, Fe, Mn, and Cd.