

INVESTIGATION OF BIOSOLIDS AND LIMESTONE IN A PILOT-SCALE VERTICAL FLOW PASSIVE TREATMENT SYSTEM

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Abstract. Numerous materials are available for utilization as the organic component in vertical flow-type passive treatment systems. Biosolids, a common waste product, was studied in a pilot-scale system installed at the Jennings Environmental Education Center in Brady Township, Butler County, Pennsylvania. A treatment media comprised of a 1.25 : 1, by weight mixture of composted, exceptional-quality biosolids and AASHTO #9 special (0.95 cm [3/8" by 16 mesh]) high-calcium limestone aggregate was placed in a 5700 L (1500 gallon) 2.4 m (8') diameter tank. Influent and effluent were monitored for "standard" coal mining parameters and a suite of metals including: As, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Se, Zn, Ca. Of the eleven metals monitored, only three showed a detectable increase in concentration from influent (raw water) to effluent (treated water), these three elements were Ca, Mo & Se. Calcium concentrations increased significantly while the other two showed only slight increases. Selenium was the only metal to be found in the effluent which was not detected in the raw water. The remaining seven metals showed decreased effluent concentrations or non-detectable changes. Zinc and nickel showed average decreases of 0.71 and 0.55 ppm, respectively. Arsenic, cadmium and chromium showed average decreases of 0.037, 0.006 and 0.008 ppm, respectively. Preliminary results found this treatment media to be comparable to the industry standard, spent mushroom compost, in the treatment of aluminum-bearing acid mine drainage.

Additional Keywords: Acid Mine Drainage, Passive Treatment, Abandoned Mine Reclamation

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