

CONTINUING EFFECTIVENESS OF A VERTICAL FLOW SYSTEM IN THE TREATMENT OF DISSOLVED ALUMINUM-BEARING MINE DRAINAGE¹

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Abstract: A Vertical Flow System, completed September 1997, was installed at Jennings Environmental Education Center (PA Department of Conservation and Natural Resources) in western Pennsylvania to passively treat a 30-gpm discharge from an abandoned underground coal mine containing 20 mg/L of dissolved aluminum. The system includes the following components in series: a Vertical Flow Pond with a treatment medium comprised of 300 tons of spent mushroom compost mixed with 380 tons of AASHTO #9 special (3/8" x 16 mesh) high-calcium limestone aggregate; a 200' X 10' channel wetland with a substrate of composted biosolids mixed with pond cleanings from a sand and gravel operation; and a 200' X 20' open water wetland/pond. Comparison of monthly/quarterly analyses of grab samples of the untreated and treated water demonstrates that the system has consistently provided successful treatment of this discharge. The following are representative sample analyses (September 1997 though June 1999): influent(raw) and effluent(discharge from wetland/pond) - 3.3 and 6.8 pH; 0 and 172 mg/L alkalinity; 284 and -145 mg/L acidity; 58 and 1 mg/L total iron; 15 and 12 mg/L manganese; 19 and <1 mg/L aluminum; 99 and 244 mg/L calcium; 665 and 712 mg/L sulfates. A decrease in concentrations of the following heavy metals (representative analyses) was also observed: influent(raw) and effluent(discharge from Vertical Flow Pond) - 850 and 40 ug/L zinc; 610 and 40 ug/L nickel; 310 and 50 ug/L cobalt. The design life of the system is about 15 years; however, as this is the earliest known installation utilizing a mixture of spent mushroom compost and limestone aggregate, there was no long-term data available to support the projected longevity. This system has been installed to document the efficacy through time in order to provide a model for the prediction of the design life of future systems.

Additional Key Words: Acid Mine Drainage, Passive Treatment, Abandoned Mine Reclamation

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