

PERFORMANCE OF A PASSIVE TREATMENT SYSTEM OVER 20 YEARS IN TENNESSEE¹

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Abstract: A passive treatment system consisting of an Anoxic Limestone Drain (ALD) with approximately 6,000 tons of limestone, two basins, and two wetland cells was constructed at a reclaimed surface mine in east central Tennessee in 1995. The system was originally designed for a flow rate of 200 gallons per minute to treat total iron concentrations of 100 mg/L and meet permit effluent limits. The system performed remarkably well for approximately 15 years. Several years following construction, the flow rates peaked at more than double the design flow which stressed the passive treatment system, but the discharge water quality targets continued to be met. In 1999/2000, a supplemental ALD system was designed and constructed to address high flow periods. In 2009, sludge cleanout was performed at the primary basin of the original passive treatment system. The sludge management was successful with nearly all of the sludge removed from the primary basin resulting in restored retention and settling capacity for the passive treatment system. Sludge was contained in the Geotubes, dried, and subsequently sold for beneficial reuse and recycling in the paint pigment industry. In 2010, NPDES effluent limits for manganese were lowered requiring upgrades to the treatment systems. The 1995 treatment system was hydraulically connected to the 2000 treatment system, manganese removal beds were installed, and additional settling capacity provided. The final effluent has met new manganese effluent limits since completion of construction upgrades in 2012.

Additional Key Words: acid rock drainage, passive water treatment, anoxic limestone drain, manganese, AMD, ARD

¹ Presented at the 37th West Virginia Mine Drainage Task Force Symposium, Morgantown, WV, March 29-30, 2016.

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