

IRON OXIDATION IN SEMI-PASSIVE TREATMENT SYSTEMS¹

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Abstract. Since the 1980's, numerous passive systems have been constructed to treat mine drainage. Some of these systems have been successfully treating water for over a decade and are projected to out-live their original 20-year design. Unfortunately, not all waters can be treated with these low-cost, low-maintenance designs. High flows and limiting terrain often combine to preclude the implementation of a totally passive system because of the large land areas required to treat the water. For this reason, the inclusion of a powered device in an otherwise passive system is being considered as a means of increasing the rate of iron oxidation and removal and thus decreasing the land needed for remediation of the drainage. Work underway at the DOE - National Energy Technology Laboratory seeks to assist in the development of emerging semi-passive technologies. For net alkaline water, preliminary laboratory results indicate that simple aeration can raise the pH (5.8 to 8.0) and dissolved oxygen concentration (0.2 to 9.0 mg/L) within a four-hour period and thereby significantly increase the iron oxidation rate. Implementation of a low-pressure blower at one site has reduced the required detention time by up to 10 hours. Additional evaluation of the effect of an active aeration will be obtained from field studies using a small, portable system. On a much larger scale, progress in the construction and operation of a flexible semi-passive system in the Swatara Watershed, Schuylkill County, Pennsylvania will be described.

Additional Key Words: mine drainage treatment, aeration.

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