

Source Control or How to Eliminate Acidophiles and Influence Water Quality¹

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Abstract: Effective acid rock drainage (ARD) source control techniques were shown to be effective over 30 years ago, but the lack of consistent, well-documented case studies and application challenges have limited its use. Barite Hill, an EPA superfund site, is a reclaimed open pit gold mine that continues to leach acid and trace metals despite periodic pit lake neutralization and the capping of waste rock stockpiles. Pit lake pH is around 3 with elevated metals; iron concentrations are around 1600 mg/L and copper is about 90 mg/L. The major source of continued acid input into the pit lake appears to be from the reclaimed waste rock stockpile, which contains three distinct zones consisting of unsaturated, transition, and saturated material. Proof of principle ARD source control tests were conducted on a bulk composite waste rock sample from several test pits. The waste rock exhibited a pH of about 3 and contained about 40% fine sand. Three different test protocols were developed for each of the three zones. ARD-inhibitors assessed included sodium lauryl sulfate (SLS), milk, and alkaline amendments alone and in combination. The best indicator of successful treatment was the composition of the microbiological community present in the samples at the end of the test. Treatment was successful in eliminating the acidophilic bacteria in all zones, but no single ARD-inhibiting strategy was capable of treating the entire stockpile. In general, combinations of treatments worked best: SLS/alkalinity for the unsaturated zone, and milk/alkalinity for the transition and saturated zone.

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