



MONTANA
STATE UNIVERSITY

NORM ASBJORNSON
College of
ENGINEERING

Master of Science in Environmental Engineering: Thesis Defense

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ABSTRACT

Investigation of Microbially Induced Carbonate Precipitation for Mitigation of Acid Mine Drainage from Coal Mining Waste

Acid Mine Drainage (AMD) is a serious environmental concern associated with coal mining. Many of the existing methods for addressing AMD are costly and focus on clean-up rather than prevention. In this study, the feasibility of using microbially induced carbonate precipitation (MICP) as an alternative method for mitigating environmental impacts from coal mining waste rock was investigated using laboratory scale experiments. Flow-through column testing showed that MICP can be used to create a calcium carbonate coating on coal waste rock, acting as a barrier between the rock and water. This treatment increased leachate pH, and microscopic inspection indicated that the presence of live bacteria was important for creating a durable coating. The MICP treatment decreased concentrations of heavy metals such as aluminum, barium, beryllium, copper, nickel, zinc, and iron in the leachate, but increased concentrations of vanadium, selenium, molybdenum, uranium, and arsenic. These results indicate that MICP may be an effective technique for mitigating AMD, but additional laboratory and field testing is needed to assess the feasibility of this treatment technology.