

## PILOT-SCALE BIOTREATMENT OF CYANIDE- AND METAL-CONTAINING WASTEWATER AT THE SUMMITVILLE MINE SUPERFUND SITE<sup>1</sup>

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**Abstract:** Cyanide heap leach operations frequently produce residual leachate containing cyanide and soluble metals requiring treatment prior to surface discharge. rinsing of ores or chemical treatment for destroying cyanide and removing metals can be very expensive. hence, a proof-of-concept experiment was performed to evaluate biological decomposition of cyanide and transformation of copper in heap leachate solutions at the Summitville Mine Superfund site. An augmented consortium of microbes was grown in a heated 500 gallon tank to serve as the treatment solution for the pilot-scale tests. Testing took place at ambient site conditions with solution temperatures near 3° C.

Three reactor configurations were tested: inline mixing with a continuously stirred tank reactor (CSTR), direct injection into a CSTR, and a CSTR followed by a fixed biomass reactor. The inline mixing/CSTR configuration resulted in a 23 percent total cyanide degradation and a 20 percent dissolved copper removal. Direct injection/CSTR resulted in a 12 percent total cyanide degradation and a 28 percent dissolved copper removal. The CSTR followed by the fixed film bioreactor resulted in an 81 percent total cyanide degradation and a 92 percent dissolved copper removal. Intermediate CSTR removals improved with culture age. Results indicate biological treatment for removing cyanide and metals from cyanide in aqueous waste streams is potentially applicable and effective under adverse site conditions.

**Additional Key Words:** Biodegradation, biofilm, continuously stirred tank reactor, copper, cyanide, Summitville Mine, CO.

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