

**TITLE:** BIOTECHNOLOGY FOR TRANSFORMATION AND REMOVAL OF INORGANIC CONTAMINANTS

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**ABSTRACT:**

Contamination of surface and ground waters, as a result of mining and mineral processing, represents some of the most complex and wide-spread environmental problems facing the nation today. The U.S. Bureau of Mines Biotechnology Program is developing and demonstrating bioprocesses to control inorganic pollution and restore environments damaged by past mining activities.

One of the many current research projects involves investigations of natural remediation mechanisms occurring at Chalk Creek, CO. This includes cooperative research with Atlanta University and coordination with the Denver Research Center, Environmental Protection Agency, Colorado State Division of Minerals and Geology, and U.S. Forest Service to characterize the mine, tunnel drainage, and wetlands at the site. The Biotechnology Program will investigate the natural remediation of mines waters containing high zinc manganese concentrations. Site bacteria, water, and solid samples have been collected to characterize remediation mechanisms occurring within the tunnel. The project goals are to determine the naturally-occurring remediation mechanism(s), maintain and enhance the mechanisms to prevent further site pollution, and apply the remediation mechanisms to other similar areas.

**TITLE:** GEOCHEMICAL OPTIMIZATION OF IN-SITU CHROMATE REMEDIATION

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**ABSTRACT:**

The U.S. EPA is conducting a significant field test of innovative in-situ remediation for metal-contaminated ground water at the Elizabeth City, NC, Coast Guard Station. High concentrations of ground water chromate ( $\text{CrO}_4^{2-}$ ) are being removed by placing a permeable metallic iron filing "reaction wall" in the plume's path to reduce Cr(VI) to insoluble Cr(III)-Fe(III) hydroxides. USBM Twin Cities Research Center is assisting EPA optimize this process by providing detailed microscopic characterization and geochemical interpretation of chromate reduction at the reaction wall. Key findings are that (1) chromate reductive remediation at iron filings follows a "corrosion-like" mechanism and (2) partial dissolution of aquifer material alumino-silicates is needed to buffer the contaminated ground water pH below 8, a range necessary for chromate reduction to occur. Current work is focused on (1) changes in the reaction wall with time in the aquifer plume and (2) investigation of secondary sorption or precipitation of Cr down gradient from the permeable reaction wall.

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ABSTRACT BOOK

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