Hypothesis

Lactate (HRC) is a low molecular weight organic electron donor that is rapidly metabolized by a variety of microorganisms to support growth and reproduction. HRC is a commercially available product developed for remediation purposes. The hypothesis of this study was to assess the potential for immobilizing Cr(VI) at Hanford using HRC biostimulation.

Objective

The study was designed to assess the potential for immobilizing Cr(VI) using HRC biostimulation. The objective was to evaluate the effectiveness of HRC injection in reducing Cr(VI) concentrations and to assess the potential for bioreduction of Cr(VI) and precipitation of insoluble Cr(III) species on soil particle surfaces or colloids.

Types of Research

- Field investigations
- Laboratory experiments
- Modeling
- Data analysis

I. Background Geological, Hydrological, Geophysical, and Microbial Conditions at Hanford 100H

- Chromium contamination
- Aquifer properties
- Hydrogeological heterogeneity
- Microbial communities

II. Lactate/Poly lactate (HRC) Properties

- Lactate is a two-carbon compound
- Lactate is metabolized by a variety of microorganisms
- Lactate is a potential electron donor for microbial growth

III.3. Geochemical and isotopic evidence

- Sulfate reduction
- Chromate reduction
- Lactate uptake

IV. Key Findings

- HRC injection results in a decrease in Cr(VI) concentrations
- Reduction of Cr(VI) is accompanied by an increase in sulfate
- Lactate is a potential electron donor for microbial reduction of Cr(VI)

Acknowledgments

This study was supported by the U.S. Department of Energy (DOE) under Contract DE-AC05-00OR22725 with Battelle Memorial Institute. The authors wish to thank the Hanford Site Remediation Branch for providing access to the site and for their support during the study.