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The role of bacteria in the mobilization of arsenic from mine impacted sediments.
(Sources)

Objectives being Investigated

The two main objectives (outlined below) for this project address 2 of the goals for the research team. Specifically, information regarding source apportionment, i.e. natural versus anthropogenic sources of release, and transformation of metals during transport, will be generated.

- 1) Microbially mediated mechanisms that favour the release and/or sequestration of arsenic in aquatic environments will be defined in a freshwater system that has received gold mine tailings for more than 50 years.
- 2) The potential for water column enrichment of arsenic from underlying sediments will be quantified in a series of laboratory and field experiments.

Study/Sampling Design

In order to test the possibility of sequestering arsenic in the sulphidic phase of the sediments of Balmer Lake, we will attempt to stimulate the SRB community. Nutrient amendments (varying amounts of sulfate and organic carbon) will be applied to the waters contained within four limnocorrals.

Peepers (diffusion samplers) will be used to collect bottom and pore waters, and levels of arsenic, iron and sulfide will be determined in these samples. Molecular analyses of the distribution and density of microbial communities will be performed over the course of the field season in each of the manipulated limnocorrals and the main basin of Balmer Lake.

Location of Field Site(s)

Balmer Lake (51° 05' N, 93° 44' W), a freshwater system (area approximately 120 ha, mean depth 3.0 m, max depth 4.0 m) in Northwestern Ontario that receives treated mine tailings from 2 active gold mines (Placer Dome and GoldCorp).

Biota Studied

Species

Characterization of novel and existing bacterial species that are capable of reducing arsenic, iron and sulfur. Currently strain identified as VC-1.

Metals, etc. Quantified

As, Fe

Biological Endpoint(s)

Bacterial population/community

Physical Material(s) Studied

Medium/Media

Sediments, pore and bottom waters

Metals, etc. Quantified

As, Fe

Bibliographic References on-file with Secretariat: No

Data Available: No

Data Archived with MITHE-SN: No

Collaborators

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Metals in the Human Environment Strategic Network

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