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Arsenic-resistant microbial biofilms and arsenic biogeochemistry in a contaminated wetland treatment system

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Our study site, Muddy Pond, in the Waverley Historical Gold Mining District (Nova Scotia, Canada) is contaminated with legacy tailings containing elevated arsenic levels (*ca* 30 g/kg). We are developing approaches to remediate the impacted wetlands using a thin reactive amendment and protective capping (TRaP) that consists of a protective cap of silica sand, zeolite, iron aggregate (referred to here as zero valent iron, ZVI), and bentonite, and a reactive amendment layer containing ZVI. The objective of this research is to examine the impact of the TRaP approach on the microbial communities in the wetlands and the effect microbial communities have on mobility and forms of As in the sediments and water. High-throughput sequencing of the V4 region of the 16S rRNA gene will be used to examine the microbial community composition within the TRaP layers and underlying sediments. Selective culturing of microbes that are resistant to arsenic on mineral surfaces with sorbed arsenic will be used to examine how biofilms impact performance of the TRaP materials. Synchrotron approaches (e.g., STXM, XAS) will be used to further investigate relationships between arsenic-resistant microbes and mineral surfaces with sorbed arsenic. Our ultimate aim with this work is to provide insights on how microbial biofilms impact speciation and spatial distribution of As on mineral surfaces in contaminated wetlands and treatment systems. This research will contribute to development of remediation strategies that minimize the environmental effects of legacy mine wastes containing arsenic across Canada.