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| Title | Transformation and mobilization of arsenic in the historic Cobalt mining camp, Ontario, Canada | | |
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| Abstract |  |
| More than eight decades of silver mining in the Cobalt mining camp of northern Ontario, Canada, have left large volumes of As-bearing mine wastes widely distributed in and along watercourses in the Cobalt area. Metal leaching from these mine wastes has led to the contamination of the area drainage with dissolved As concentrations at least an order of magnitude higher than the Canadian drinking water criterion of 0.025 mg l− 1. To clarify the transformation and mobilization of arsenic in the historic mining camp, a portion of an extensive wetland located in northeast Cobalt and partially filled with historic tailings has been sampled for detailed characterization, chemical analysis and extraction tests. Field deployment of anionic exchange membranes, As sorption isotherm and desorption analyses in conjunction with chemical and mineralogical analyses indicate that: (1) the submerged tailings are likely a source instead of a sink of arsenic to the local streams; and (2) Al-minerals are the main sorbents for As with significant P competing for the available sorbing sites. Subjecting selected samples to a laboratory redox experiment complemented with X-ray absorption spectroscopic analyses confirms that changes in arsenic speciation readily occur with changes in redox conditions in the surface sediments, resulting in rapid mobilization of arsenic. Preliminary enumeration of iron- and sulfur-reducing bacteria at selected sites coupled with scanning electron microscopic analyses show that microbial sulfate reduction occurs locally in the wetland, possibly leading to co-precipitation of arsenic as a sulfide in associated with framboidal pyrite. Further detailed study of the bacteria responsible for the arsenic transformation in conjunction with arsenic speciation analysis is recommended. | |

**Please specify which Sustainable Development Goal (SDG) (s) falls under your research:**

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| Goal 1 | No Poverty | Goal 2 | Zero Hunger |
| Goal 3 | Good Health and Well-Being | Goal 4 | Quality Education |
| Goal 5 | Gender Equality | **Goal 6** | **Clean Water and Sanitation** |
| Goal 7 | Affordable and Clean Energy | Goal 8 | Decent Work and Economic Growth |
| Goal 9 | Industry, Innovation and Infrastructure | Goal 10 | Reduced Inequalities |
| Goal 11 | Sustainable Cities and Communities | Goal 12 | Responsible Consumption and Production |
| Goal 13 | Climate Action | Goal 14 | Life below Water |
| Goal 15 | Life on Land | Goal 16 | Peace, Justice and Strong Institutions |
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