

## **Fugitive mine dusts in Canada: their capture, characterization, and impacts**

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The challenge of monitoring and managing dust is ubiquitous to all mining operations. Available dust-monitoring and analytical techniques provide limited information on the spatial distribution and composition of mine dust, and the significance of their environmental impact is often unclear. The Fugitive Mine Dust Monitoring Program at CanmetMINING (Natural Resources Canada) is evaluating the relative performance of dust capture technologies in different mining settings; developing new approaches to characterizing dust and differentiating dust sources; unlocking mine dust archives in peat; and investigating the environmental impact of mine dust. This presentation focuses on results from a two-year dust study at an active gold mine in northern Quebec. Dust samples were captured using Passive Dry Deposition Collectors and dust canisters, and were subsequently analyzed for total dust mass, reactive element chemistry, and major, minor and accessory mineral phases. To date, the results have provided information on: 1) the relative volume of dust emissions at different locations around the mine; 2) the mine's dust footprint; 3) the flux of environmentally significant elements (e.g., As, Cu, Ni) to the near-mine environment; and 4) the mineral carriers of elements and their relative abundance in the dust. The captured mine dust is being compared against mine-dust depositional records captured in the peatlands neighboring the mine site. The investigation of mine dust archives preserved in peat provides an opportunity to understand mine dust evolution throughout a mine's history, delineate it from pre-mining environmental dust signatures, and investigate ecological changes that correlate with mine dust deposition. In addition to improving our ability to monitor fugitive mine-dust emissions, studies of this nature inform our understanding of mine dust characteristics and their role in delivering elements of concern into the ecosystem.