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Arsenic in abandoned gold mines: from source to transport, bioaccessibility to potential health impacts

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The historic mining and processing of gold ores throughout the state of California has resulted in an environmental legacy of exposed mine wastes, many of which contain naturally-occurring yet highly enriched concentrations of arsenic and other trace metal(loid)s. Elevated arsenic concentrations (10^2-10^4 mg/kg) in fine-grained mine waste materials with a high potential for dispersal and transport has generated environmental and health concerns among abandoned mine sites throughout the state. Extensive characterization of the mine waste materials, scope of contamination, geochemical processes related to the waste materials, and both short- and long-term impacts of elevated arsenic in mine-affected regions is needed to better constrain potential health risks to local human populations.

Our research group has over the past decade investigated a wide range of physical and geochemical processes related to arsenic contamination in abandoned gold mines, including:

- Concentration, spatial distribution and transport mechanisms of arsenic from mine point sources
- Chemical speciation, microspatial distribution and solubility of arsenic
- Effects of particle size and long-term physical/chemical weathering on arsenic bioaccessibility
- *In vitro* arsenic bioaccessibility through simulated gastric, bulk lung, and phagolysosomal fluids
- *In vivo* bioavailability of arsenic through the inhalation pathway as assessed through live animal exposures

This presentation will provide an overview of the field, benchtop, spectroscopic, and live animal techniques employed, the key findings from these investigations, and the implications of these findings on the potential for acute and chronic arsenic exposure in arsenic-contaminated gold mining environments.