Determining trends in arsenic bioaccessibility through *in vitro* extractions of mine waste from the Mojave Desert, California

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The mining and processing of gold and silver in the Mojave Desert has generated large quantities of exposed mine wastes containing elevated levels of arsenic (As), a known carcinogen. Currently, regulatory agencies primarily rely on bulk As concentrations to determine potential human exposure, even though concentration can vary dramatically, and often inversely, as a function of particle size.

To determine their potential for human exposure and the effects of physicochemical characteristics on As bioaccessibility, processed mine tailings and unprocessed waste rock from five mines were analysed for initial concentration, particle size, and surface area. Size-separated samples were then exposed to simulated gastric fluid (SGF) and water leach extractions.

Expressing bioaccessibility as percent As released displayed a positive correlation with surface area (R^2 = 0.47-0.85), but when expressing bioaccessibility as total released As concentrations only initial concentration had a strong correlation (R^2 = 0.19-0.94). In both analyses, measured variables could not fully explain the observed differences in bioaccessibility, but waste rock and mine tailings samples exhibited fundamentally different bioaccessibility trends.

Extended X-Ray absorption fine structure (EXAFS) spectroscopy analysis of samples before and after SGF extraction was applied to determine mass changes in As species post-extraction and assess how speciation in individual samples may account for additional variations in bioaccessibility.