

## **Comparison of Geochemical and Physiologically Based Extraction Tests to determine Arsenic risks at historic mining sites**

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Many abandoned mine sites are characterised by elevated concentrations of arsenic which can cause contamination of surrounding soil and water resources. Often these sites have important historical and cultural value that requires access to be maintained, despite the potential toxicity of arsenic. The assessment of arsenic bioavailability is often confused with general environmental tests that do not compare the same conditions.

At two historic mines, one in Cornwall and the other in the Comstock in Nevada a series of geochemical and bioavailability tests have been undertaken on different types of arsenic bearing waste. The purpose was to compare typical regulatory environmental assessment tests to Physiologically Based Extraction Tests (PBET).

The results show that for different types of mine waste, different approaches are acceptable. Where arsenic is in a highly soluble form, then all tests show comparatively similar results. Where stable secondary arsenic phases are present or arsenic is dominantly held in sulfide minerals then the environmental leach tests tend to underestimate arsenic concentrations compared to PBET results. The main factor in this is the slow dissolution of the more stable arsenic minerals in the environmental leach tests. A solution to this, would be to supplement environmental leach testwork with mineralogy of mineral speciation analysis, such as selective extraction procedures and then use this data to modify leach results accordingly.

The development of PBET tests for arsenic bioavailability provides useful insight into potential toxicity related to accidental digestion of arsenic bearing mine waste and in terms of human health issues probably a more pertinent determination than more traditional regulatory environmental leach tests.