

Category III - Water Quality

Kinetics of inorganic arsenic contamination in surface and ground waters

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Executive Summary:

In February 2002 the EPA reduced the maximum allowable contamination level for arsenic in drinking water from 50 ppb (ug/L) to 10 ppb. The date by which most water systems must comply with the new 10 ppb standard is January 23, 2006. This important regulatory change drives a need for better knowledge of the kinetics (rates) of arsenic contamination in surface and ground waters.

Arsenic found in surface and ground waters is derived from a variety of natural and anthropogenic sources, including minerals such as arsenopyrite (FeAsS) that are present in rocks and ores, and man-made compounds such as chromated copper arsenate (CCA) that are used in wood preservation. Arsenic contamination from mining waste is already a major problem in several areas of California, and CCA is predicted to become a major environmental issue within the next several years.

We propose a series of laboratory experiments designed to quantify the kinetics (rates) of arsenic release into surface and ground waters from these natural minerals and man-made compounds. The experimental results will be used to develop mathematical equations (rate laws) expressing the effects of environmental parameters (pH, temperature, Eh, etc.) on the rate of release of arsenic into natural waters. These data will help researchers assess: 1) the role of inorganic processes that generate elevated levels of dissolved arsenic in surface and ground waters, 2) the significant kinetic parameters that need to be addressed in building and refining computer models of arsenic contamination and remediation, and 3) the risk of imported waters acquiring natural dissolved arsenic during their residence times in local aquifers and catchment basins.