



CLASS V UIC STUDY FACT SHEET *SOLUTION MINING WELLS*

What is a solution mining well?

Solution mining wells are used to extract desired minerals from mines that have already been conventionally mined. Leaching solutions (called “lixiviant”) are injected through solution mining wells into an underground ore deposit, metals are leached from the ore, and the resulting “pregnant” solution is pumped to the surface for subsequent recovery from the solution. Wells used to inject lixiviant into ore bodies that have not been conventionally mined beforehand are considered Class III solution mining wells, not Class V.

What types of fluids are injected into solution mining wells?

The characteristics of the injected solution are highly dependent on those of the ore body being mined because a variety of metals present in the ore are incorporated into the solution as it goes through repeated cycles of injection, extraction, and reinjection.

Do injectate constituents exceed drinking water standards at the point of injection?

Available data on the composition of solution mining fluids indicate that the concentrations of sulfate, molybdenum, radium, selenium, arsenic, lead, and uranium exceed primary drinking water standards and health advisory levels. Concentrations of total dissolved solids, chloride, manganese, aluminum, iron, sulfate, and zinc have been measured above the secondary drinking water standards.

What are the characteristics of the injection zone of a solution mining well?

In many cases, the hydrogeology of the injection zone, or mined ore body, has already been altered by ground water pumping as well as previous mining. In uranium mining, for example, the formation is a water-bearing sandstone. As part of solution mining operations, ground water flow is normally modified to create a drawdown, or zone of depression, so that the injected lixiviant is retained in the leaching zone for subsequent recovery.

Are there any contamination incidents associated with solution mining wells?

No ground water contamination incidents have been identified that are directly attributable to Class V solution mining injection wells. However, the fluids injected into these wells inherently contain a variety of metals at concentrations above drinking water standards or health advisory levels, and contamination resulting from a combination of mining-related activities has been reported at several sites. Elevated concentrations of metals have been observed in ground water in the vicinity of solution mining operations, but complex hydrogeology and other mining and mining-related activities make it difficult to attribute the cause to a specific activity, such as solution mining injection wells.

Are solution mining wells vulnerable to spills or illicit discharges?

No information was collected that indicates these wells are vulnerable to receive spills or illicit discharges.

How many solution mining wells exist in the United States?

There are 2,694 documented solution mining wells in the United States.

Where are solution mining wells located within the United States?

Eight of the documented solution mining wells are associated with a uranium mine in NM; the remaining wells occur at two copper mines in AZ.

How are solution mining wells regulated in states with the largest number of this type of well?

Individual permit: AZ, NM

Where can I obtain additional information on solution mining wells?

For general information, contact the Safe Drinking Water Hotline, toll-free 800-426-4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding federal holidays, from 9:00 a.m. to 5:30 p.m. Eastern Standard Time. For technical inquiries, contact Amber Moreen, Underground Injection Control Program, Office of Ground Water and Drinking Water (mail code 4606), EPA, 401 M Street, SW, Washington, D.C., 20460. Phone: 202-260-4891. E-mail: moreen.amber@epa.gov. The complete Class V UIC Study (EPA/816-R-99-014, September 1999), which includes a volume addressing solution mining wells (Volume 12), can be found at <http://www.epa.gov/OGWDW/uic/cl5study.html>.
