



MINERAL POLICY

C E N T E R

Protecting Communities and the Environment

MPC Fact Sheet: Cyanide

What is Cyanide?

Cyanide (CN⁻) is a negatively charged metal ion made of a carbon atom and a nitrogen atom. Cyanide solutions readily form soluble bonds with gold and silver, which is why the mining industry uses it.

Cyanide is usually stored and transported as a solid. It is stable when dry. Cyanide solids will dissolve in water or weak alkaline solutions to produce cyanide gas. When in gas form, it is called "free cyanide." Cyanide gas is colorless, but smells of bitter almonds.

Cyanide is produced naturally in minute, harmless quantities in several plants, such as in apple seeds, soil bacteria and species of invertebrate organisms.

How does Cyanide affect living organisms?

Cyanide is *highly* toxic. Cyanide is the killing agent used in gas chambers.

Cyanide poisoning can occur through inhalation, ingestion and skin or eye contact. One teaspoon of a 2% solution can kill a person. In general, fish and other aquatic life are killed by cyanide concentrations in the *microgram per liter* range, whereas bird and mammal deaths result from cyanide concentrations in the *milligram per liter* range.

A cyanide spill in Romania on January 30th, 2000, killed thousands of fish and made a significant portion of the Danube River watershed undrinkable and hostile to aquatic life.

Evidence shows that cyanide compounds linger in affected plant and fish tissues and can persist in the environment for long periods of time.

How is Cyanide used in mining?

There are two types of cyanide-leaching processes used by the modern mining industry. Vat-leaching, where extracted ore is combined with cyanide in vats, and heap-leaching (described below). Cyanide-leaching allows mining companies to reopen and expand mines containing what were previously unprofitable mineral reserves.

The heap-leaching process, more commonly used than vat-leaching, involves -

- digging enormous pits, so large they could swallow cities, and piling the extracted ore into heaps that would cover many football fields several hundred feet high;
- spraying a cyanide solution over the heaps so that the cyanide trickles down through the ore, bonding with microscopic flecks of gold or silver, whereupon a heap pad (a rubber blanket) underlying the heap channels the solution into a holding pond; and
- stripping the solution of the precious minerals, then spraying the cyanide solution over the heap again.

In the extraction of copper, nickel, cobalt and molybdenum, cyanide is used during the milling and concentration processes.

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What are the dangers of using Cyanide?

Cyanide-leaching, as practiced by the modern mining industry, is inherently dangerous to the environment and the communities surrounding a mine that uses the process. As cyanide use continues, so do serious accidents and spills. 4 recent examples are:

- Zortman-Landusky Mine, Montana, 1982: 52,000 gallons of cyanide solution poison the drainage that supplies fresh drinking water for the town of Zortman. The accident was discovered when an employee of the mine noticed the smell of cyanide in his tap water at home.
- Summitville Mine, Colorado, 1992: Summitville gold mine was responsible for contaminating 17 miles of the Alamosa river with cyanide and other contaminants.
- Kumtor Gold Mine, Kyrgyzstan, central Asia, 1998: A truck carrying 2 tons of sodium cyanide crashed into the Barskoon river. 2,600 poison cases and 4 deaths were reported in the aftermath.
- Aural Gold Plant, Romania, eastern Europe, 2000: A cyanide-laden tailings spill sent a toxic slug of cyanide rolling down the Tizsa river and into the Danube, killing aquatic wildlife and poisoning water supplies as far as 250 miles downriver.

Cyanide reacts with many other elements and is known to breakdown into several hundred different cyanide-related compounds. Despite the risks posed by these breakdown compounds, mines are **not** required to monitor or report these chemicals. For more information contact Mineral Policy Center (202-887-1872) and the Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/>).

What is the bottom line about Cyanide?

Despite mining industry assertions to the contrary, the record demonstrates that cyanide-leach mining is not being practiced safely. It is potentially very dangerous to the environment, wildlife and humans. The hardrock mining industry has a history of cyanide spills, with billions of gallons of cyanide contamination released into the environment, ever since cyanide-leaching began in the 1970s.