

Cyanide Fact Sheet

What is Cyanide?

Cyanide is a chemical compound that has been used for over a century in the mining industry, primarily to extract gold and silver from ore. While highly effective and economically efficient, its use has raised public concerns due to the potential risks to human health and the environment. Cyanide is highly toxic and can cause harm to people, animals, and the environment; robust safety management methods are essential in reducing risk. This fact sheet is intended to provide clear information about the use of cyanide in mining, how it can be managed safely and responsibly, and its proposed use at the Grassy Mountain Project site in Malheur County, Oregon.



The Grassy Mountain
Project site in NW
Malheur County, OR

What is the History of Cyanide Use in Mining?

Cyanide has played a central role in gold mining since the late 19th century, enabling the efficient extraction of gold from low-grade ores. While its widespread adoption brought significant industrial benefits, it also introduced consequential environmental and safety risks.

Over time, evolving practices and regulations have reduced these hazards:

- **Origins:** Cyanide use in mining began with the MacArthur-Forrest process in 1886, resulting in increased extraction efficiency and cost-effectiveness.
- **Global Expansion:** Cyanide use grew throughout the 20th century as mining technologies advanced, allowing profitable extraction from low-grade ores.
- **Early Risks:** Initial practices lacked environmental safeguards, leading to contamination via releases into the environment.
- **Regulatory Response:** Over time, stricter national regulations and industry standards improved on-site safety, handling protocols, worker training, and reduced environmental exposures.
- **International Cyanide Management Code (ICMC):** Introduced in 2002, the ICMC is a voluntary global standard for the safe transportation, storage, use, and disposal of cyanide in mining.
- **Current Use:** More than two billion pounds of cyanide are produced annually in the U.S. for mining, steel production, electroplating, plastics, tanning, and other industrial applications.

How is Cyanide Presently Used in Mining?

Cyanide is a highly effective chemical in ore processing to extract gold and silver. It works through a process called "leaching" whereby metals are dissolved from crushed rock using a cyanide solution. Two main methods are employed: heap leaching and modern milling. Both methods are now employed in conjunction with impermeable liners and water management systems to prevent soil or water environmental contamination. While alternative leaching agents are being researched, none are currently used commercially for gold production in the U.S. Cyanide remains the most effective, economical, and widely used gold extraction method.

Heap Leaching:

- Involves piling crushed ore on a lined pad and applying a cyanide solution.
- The solution percolates through the ore, dissolving gold into solution, which is then extracted from a collection pond.
- Gold is extracted from solution using activated carbon. Residual waste (spent ore) remains in the pile.
- Lower costs but lower gold recovery (55% to 75%) compared to modern milling.

Modern Milling:

- Ore is finely ground in a rotating drum, then mixed with cyanide in tanks.
- Gold is extracted using activated carbon.
- Residual waste (tailings) is stored in a lined, engineered tailings storage facility.
- Results in higher gold recovery (up to 90%) compared to heap leaching.

How is Cyanide Managed Safely on Mine Sites?

U.S. mining operations that use cyanide must adhere to strict safety and environmental protocols throughout its lifecycle—from purchase to use and ultimately, disposal. Figure 1 shows example stages of the cyanide lifecycle and oversight at mine sites. These controls are designed to protect workers, the public, and the environment from the potential hazards of cyanide.

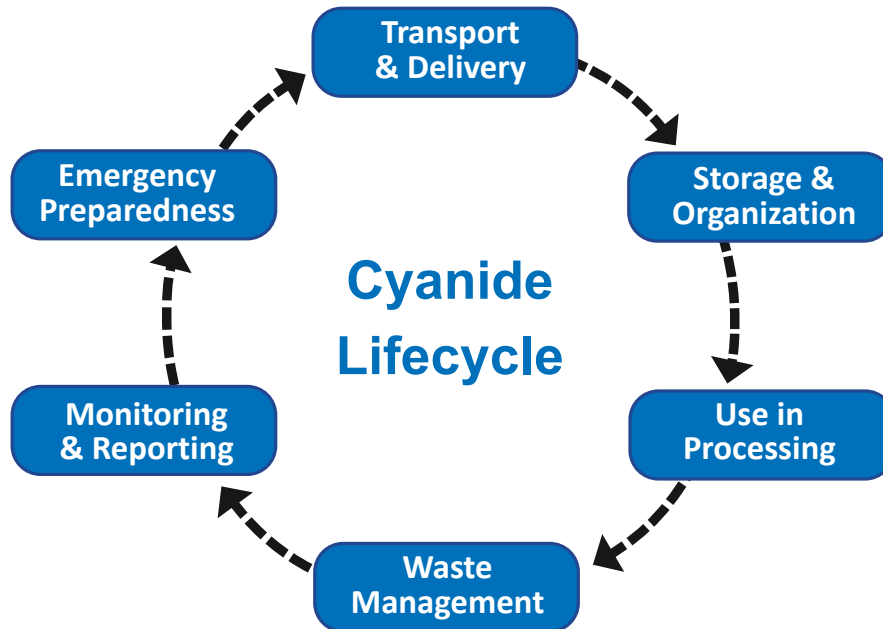


Figure 1. Example of cyanide lifecycle and oversight at mine sites, illustrating key management stages. Adapted from the ICMC for illustrative purposes.

Transport & Delivery

- Safe management throughout transportation process
- Secure, labeled containers
- Handled by trained personnel, with a clear line of responsibility
- Additional Department of Transportation regulations

Storage & Organization

- On-site containment with access control
- Inspection standards
- Storage and mixing facilities consistent with quality control and assurance measures

Use in Processing

- Trained staff, controlled dosing
- Contingency planning in use
- Operational permits
- Measures to protect people, wildlife, and the environment

Waste Management

- Detoxification and containment
- Water quality regulations
- Treated tailings
- Spill prevention and spill containment measures established

Monitoring & Reporting

- Implemented regular environmental monitoring programs
- Routine sampling audits
- Regulatory compliance checks

Emergency Preparedness

- Spill response protocols
- Prepared emergency response plans
- Enforcement oversight

Upon completion of mining operations, best practices and regulations are employed for effective and safe decommissioning of facilities that handle cyanide including thorough cleaning, dismantling, or securing processing plants, storage tanks, pipelines, and tailings facilities (dewatering of supernatant pond, capping, and revegetation) to eliminate any remaining risk of leaks or exposure.