

Use of Cyanide at Barrick Goldstrike

This following is a general overview of the manufacture, transport and use of sodium cyanide in the gold industry, with specific information regarding cyanide management at Barrick's Goldstrike operations. Much of this information is also available from the International Cyanide Management Institute at www.cyanidecode.org. For additional information on Barrick's responsible cyanide management practices, please contact Barrick Gold of North America at 775.778.3830.

Public Dialogue

Goldstrike has provided this information to a variety of stakeholders in several formats, including:

- Media coverage
- Printed publications
- Submittals to regulatory agencies
- Tours of Goldstrike facilities
- Updates on this website

Introduction

Gold typically occurs at very low concentrations in ores - less than 10 grams per ton. At these concentrations, the use of water-based chemical (hydrometallurgical) extraction processes is the only economically viable method of extracting gold. At Goldstrike, ores are treated by roasting or autoclaving prior to leaching in a water-based sodium cyanide solution. As a noble metal, gold is not soluble in water. Sodium cyanide stabilizes the gold molecule in solution, in combination with an oxidant, such as oxygen.

Manufacture, Transport and Storage of Cyanide

Worldwide, approximately 1.4 million tons of cyanide are produced annually. Of this total, about 87 percent is used to produce basic industrial and consumer items, such as plastics, adhesives, fire retardants, cosmetics, pharmaceuticals, foods and anti-caking additives. The remainder is used to produce cyanide reagents for primary mineral processing to recover copper, zinc, silver and gold.

Cyanide is manufactured in a variety of forms for use in the mining industry, including solid briquettes. Goldstrike uses liquid sodium cyanide that is transported to the mine by specialized tanker trucks and is off-loaded into contained storage tanks. Goldstrike's cyanide is supplied only by companies that are in full compliance with Federal, State and International Cyanide Management Code requirements.

Leaching with Aqueous Cyanide Solutions

When gold is leached using a water-based cyanide solution, it forms a very stable gold-cyanide complex. The feed rate of cyanide is carefully controlled to maintain an optimum cyanide level. Typical cyanide concentrations in process solutions at Goldstrike range from 100-400 milligrams per liter or 0.01-0.04% as sodium cyanide, depending on the mineralogy of the ore.

In a conventional milling and agitated leaching circuit, the ore is milled in semi-autogenous ball or rod mills until it is the consistency of powder. At Goldstrike, roasting ores at high temperatures or autoclaving ores with both heat and pressure is also used to remove encapsulating minerals such as carbon or iron pyrite. The milled ore (slurry) is conveyed to a series of leach tanks. The slurry is agitated in the leach tanks, either mechanically or by means of air injection, to increase the contact of cyanide and oxygen with the gold and enhance the efficiency of the leach process. The cyanide then dissolves gold from the ore and forms a stable gold-cyanide complex.

Absorption of gold molecules onto activated carbon further concentrates the metal product. The gold is then stripped from the activated carbon and is recovered by electro-winning and refining, where the gold is poured into bars for shipment. Following gold recovery, the remaining material (tailings) is neutralized, reducing any cyanide in the tailings to a safe level prior to deposition into a lined facility.