

## SODIUM CYANIDE IN THE GOLD AND SILVER EXTRACTION PROCESS

Sodium Cyanide (NaCN) is used in the processing of gold and silver ores at Waihi. The first cyanidation plant in the world was established locally in 1889 at the Crown Mine in Karangahake. This process significantly improved gold recovery rates; from approximately 40-50% to 85-95%.

Today, cyanidation remains the most widely used method for extracting gold from ore globally. Although processing technology and chemical management has advanced considerably since 1889, the fundamental chemical principles of cyanidation remain unchanged.

Given cyanide's historical reputation, concerns about its toxicity are understandable. However, while cyanide can be lethal in certain forms and concentrations, it also occurs naturally, is not toxic in all forms, and does not accumulate in the body. It is neither a heavy metal nor radioactive.



## CYANIDE AND THE ENVIRONMENT

Cyanide undergoes various natural reactions and transformations, meaning it does not persist in the environment.

At Waihi, trace amounts of residual cyanide remain in the tailings (waste material left after ore processing) when first deposited in the Tailings Storage Facilities (TSFs). These TSFs are operated with a 'wet cap', a layer of water approximately one to two metres deep. This approach is used because cyanide breaks down rapidly when exposed to water and ultraviolet (UV) sunlight. In less than a week, most free cyanide degrades into carbon and nitrogen compounds, similar to basic fertilisers.

Any seepage from the TSFs is collected via an under-drainage system built into and beneath the embankments during their construction. Additionally, our water treatment plant includes a pre-treatment stage specifically designed to destroy cyanide used during extraction. After treatment and independent testing, surplus water is discharged into the Ohinemuri River under strict consent conditions. The river's aquatic biology is regularly monitored, and trout continue to be recorded near the discharge point, both within and beyond the mixing zone. Treated water has been discharged for many years now without any significant adverse effects on the aquatic biology having been identified.

Naturally occurring cyanide is present in many everyday foods and items. In New Zealand, the Drinking Water Standard allows for up to 0.6 parts per million (ppm) of cyanide. The water we discharge from site contains approximately 0.007 ppm of cyanide, about 85 times less than the standard.

For context, almonds naturally contain between 16 and 1,215 ppm of cyanide, and a single cigarette can contain up to 1,550 ppm. In fact, to match the cyanide exposure of a single cigarette, you would need to drink approximately 221 litres of discharge water.

### DID YOU KNOW?

Cyanide breaks down rapidly when exposed to water and ultraviolet (UV) sunlight.



### DID YOU KNOW?

To match the cyanide exposure of eating 100g of almonds would require drinking up to 1,736 litres of discharge water.

## SAFETY & CONTROLS

OceanaGold Waihi has maintained a Cyanide Management Plan for many years. A comprehensive database spanning over 30 years of modern use demonstrates that cyanide can be safely transported, stored, used, and disposed of without significant adverse effects on the environment.

Key safety measures include:

- Controlled storage areas
- Fixed gas monitoring sensors and alarms
- Primary, secondary, and tertiary containment systems
- Automated processes to minimise human interactions
- Isolated piping systems to prevent contact with the water network.

Emergency procedures are in place, including the permanent onsite storage of neutralising agents to dose and detoxify any material in the unlikely event of a spill. These controls ensure safe operation and regulatory compliance.

Globally, OceanaGold also conforms to the World Gold Council's Responsible Gold Mining Principles (RGMPs), established in 2019. These principles set clear expectations for responsible mining practices across ten key areas. Sub-principle 8.3 requires OceanaGold to:

*"Ensure that our arrangements for the transport, storage, use and disposal of cyanide are in line with the standards of practice set out in the International Cyanide Management Code."*

Our policies, systems, and controls are independently assured each year to confirm ongoing compliance with the RGMPs.

Further information on the RGMPs and related topics will be provided in a future 'Update'.

FOR MORE ABOUT CYANIDE USE AT WAIHI  
[www.waihigold.co.nz/environment/environmental-management/cyanide-and-acid-drainage/cyanide](http://www.waihigold.co.nz/environment/environmental-management/cyanide-and-acid-drainage/cyanide)