

## What are environmental protection measures?

State and federal agencies oversee a comprehensive network of mining regulations intended to prevent or mitigate impacts to the environment.

All mines - proposed, operating or closed, must follow all regulations for the full life-cycle of the mine from exploration through closure and reclamation.

Today, state and federal regulations covered by environmental review and permits include protections for:

- Water quality
- Drinking water supply
- Air quality
- Wetlands
- Endangered species
- Plant life
- Cultural resources

## How are mines permitted?

Mining permits are granted on the basis of the findings of an environmental review. Permits ensure that environmental protection measures and applicable regulations are followed.

Permits dictate how facilities are constructed, operated and eventually closed. Permits also include environmental monitoring and reporting requirements to ensure facilities remain in compliance.

Mines in Minnesota are also required by state law to have bankruptcy-proof financial assurance for reclamation and closure performance. Permit noncompliance can result in corrective actions, fines or a permit being withdrawn.

### Key Terms

**Reclamation:** Restoring mined lands to an economically usable or natural state as dictated by permits

**Life-cycle:** The stages of a mine: exploration, development, operation and closure/reclamation

## Twin Metals Minnesota Project site

After years of environmental study, Twin Metals Minnesota (TMM) has developed a mine plan of operations for its project.

Environmental conditions and key design criteria are being considered to avoid, minimize and mitigate effects to the environment.

### Key factors in which the Twin Metals Minnesota Project is reducing its impact:

- No open mine pit
- No mining activity under Birch Lake reservoir
- Tailings are non-acid generating
- No waste rock stockpiles
- No tailings storage ponds
- No tailings dam



Photo by Glenn Barr/Twin Metals Minnesota

*This image shows both active and reclaimed dry stack tailings storage at the Greens Creek Mine located near Juneau, Alaska.*

- No discharge for contact/process water
- No measurable subsidence is anticipated
- Greenfield site means no existing legacy issues

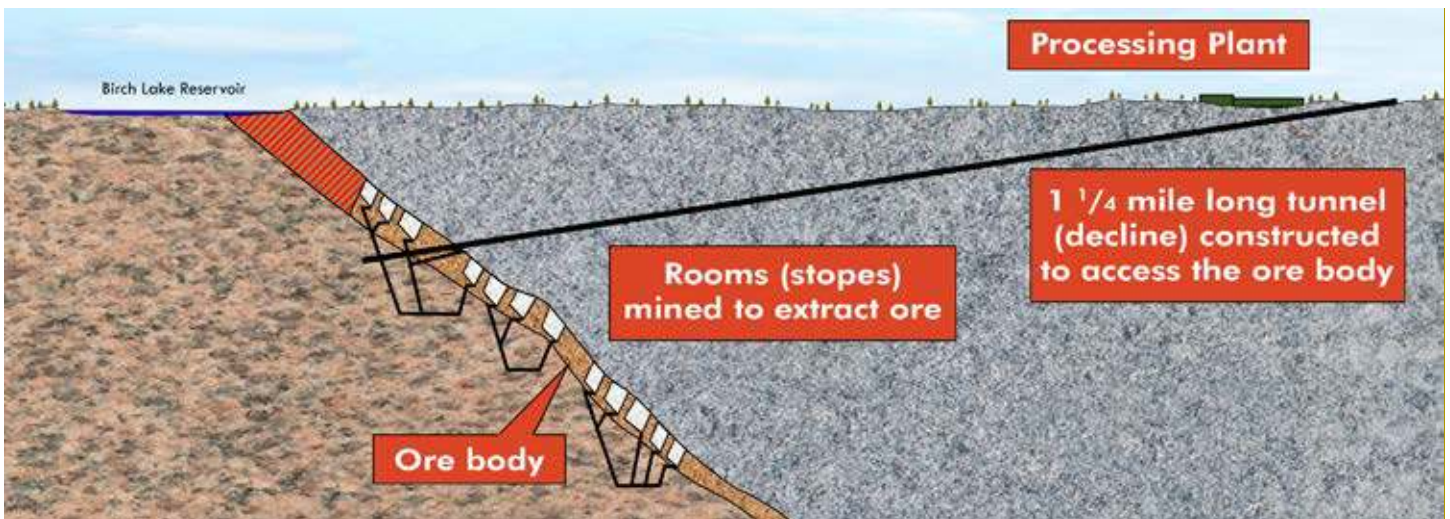
## Dry stack tailings

After receiving feedback from regulators and the public, TMM has decided to use dry stack tailings storage in the mine design to eliminate concerns about dam failure and protect the environment through the best available technology.

### Other global best practice environmental protections would include:

- Mining activity would occur underground in a state of the art, 21st-century mining facility.

- Backfilling of excavations will stabilize the mine site.
- The TMM Project design eliminates the need for surface waste rock piles.
- Ore would be stored in a covered stockpile prior to processing.
- Water reuse practices (preliminary modeling indicates a wastewater treatment plant would not be needed on-site).
- Surface infrastructure designed to minimize potential impacts to wetlands.
- Removal of the majority of surface infrastructure in closure
- All ore will be crushed underground
- Three ventilation raises



Twin Metals Minnesota Mine

*\*illustration not to scale*

### Links to Environmental Protection Resources:

TMM website  
[www.twin-metals.com](http://www.twin-metals.com)

United States Environmental Protection Agency  
[www.epa.gov/regulatory-information-sector/mining-except-oil-and-gas-sector-naics-212](http://www.epa.gov/regulatory-information-sector/mining-except-oil-and-gas-sector-naics-212)

International Council on Mining and Metals  
[www.icmm.com/](http://www.icmm.com/)

Mining Association of Canada Towards Sustainable Mining  
[www.mining.ca/towards-sustainable-mining/](http://www.mining.ca/towards-sustainable-mining/)

United States Bureau of Land Management  
[www.blm.gov/](http://www.blm.gov/)

Minnesota Department of Natural Resources  
[www.dnr.state.mn.us/](http://www.dnr.state.mn.us/)

Minnesota Pollution Control Agency  
[www.pca.state.mn.us/](http://www.pca.state.mn.us/)