

Overview

Mining companies are facing significant challenges in their efforts to de-carbonize. Conventional powering technologies like diesel, tethered and batteries are not simultaneously clean, safe, and productive. Hydrogen fuel cell powered equipment however have the ability to improve health and comfort, as well as reduce operating costs for mining industry. Hydrogen safety in underground confined spaces is however a concern and is not understood. The effect of ventilation to dilute and remove hydrogen from underground mining environments is not understood. Similar issues of safety have also been identified by the tunnelling community. The ventilation test facility (VTF) is developed to address the unqualified concerns associated with hydrogen in tunnelling and underground mining.



Issues to be addressed by the VTF

- Little information on the behaviour of hydrogen (release, turbulence) in enclosed spaces and none for mining, with and without ventilation and behaviour versus lower flammability levels.
- Design, performance, reliability of available on-board hydrogen storage: safety assessments, hazard analyses.
- Develop mine regulations, hydrogen codes and standards.
- Address mine-specific aspects: planning, ventilation, emergency response, fire suppression, etc.
- Lack of dedicated refueling infrastructure.
- Lack of performance and durability data (vehicles, hydrogen infrastructure).

Objective

- Addressing the identified issues by evaluating and quantifying the risks associated with the use of hydrogen in ventilated underground mining and tunnelling environments.

Benefits of hydrogen in mining

- De-carbonization
 - Eliminate CO₂ emissions
- Health and comfort
 - Eliminate harmful diesel particulate emissions
 - Reduced noise
 - Reduced vehicle heat load
- Reduced operating and production costs
 - Lower ventilation operating costs
 - Lower maintenance cost
 - No performance degradation during shifts
 - Quick refuelling

