Department of Local Government, Industry Regulation and Safety
GOVERNMENT OF WESTERN AUSTRALIA
WorkSafe Western Australia Mines Safety

Health and Safety Bulletin No. 24

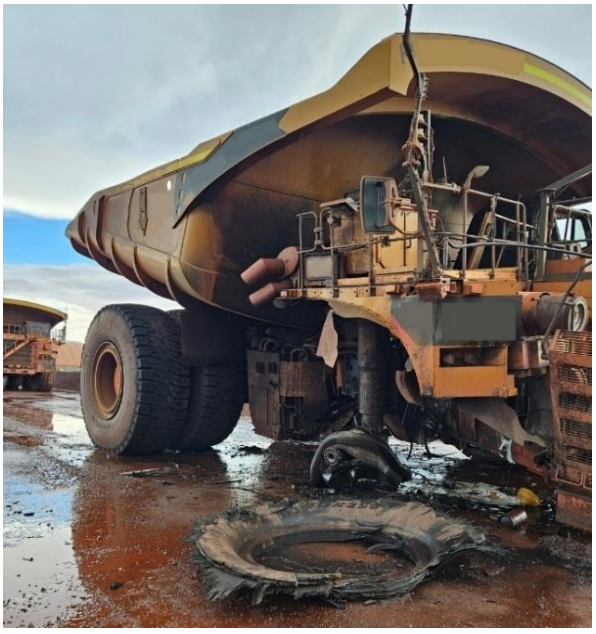
Hazard of lightning strikes on haul trucks

Date: 23 March 2026

Background

Lightning strikes, whether direct or nearby, are a well-known hazard on mines. Between 2017 and 2025, 14% of all lightning incidents reported to WorkSafe Mines Safety involved vehicles.

During this period, five strikes were reported on haul trucks, with two resulting in tyre explosions. While no serious injuries occurred, these incidents demonstrate the significant risk of injury.



Left: position 2 tyre explosion following lightning strike (2025). Right: autonomous haul truck cabin damage following lightning strike and position 2 tyre explosion (2018).

Summary of hazard

When lightning strikes a vehicle or mobile plant, operators and bystanders may be exposed to hazards such as:

- electric shock in the cabin from direct strike, touch voltage or side flash
- projectiles and shockwaves from tyre rupture or explosion due to pyrolysis
- loss of control due to electrical system failure or operator distraction
- fire from combustion of tyres, fuel, batteries, or other components.

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Contributory factors

- The cabin of a vehicle or mobile plant is not a perfect Faraday cage meaning lightning can directly strike a person or object inside the cabin.
- Pyrolysis can occur within tyres after a vehicle is struck by lightning, creating conditions that may cause the tyres to burst or explode.
- Tyre explosions from pyrolysis can occur instantaneously or up to 24 hours after the lightning strike.
- Projectiles from tyre explosions have been recorded to travel up to 300 metres.
- While filling tyres with nitrogen has been considered a preventative measure against pyrolysis, there have been reports of tyre pyrolysis and explosions involving nitrogen-filled tyres as pyrolysis can still occur in a deoxygenated environment.

Recommendations

- Review or establish lightning trigger action response plans (TARPs) to manage worker exposure during lightning storms while operating vehicles. Lightning TARPs define actions to take when mine conditions deviate from normal conditions, including safety protocols based on lightning proximity and clearly assigned worker roles and responsibilities.
  - Ensure a lightning monitoring system is implemented.
  - Assess distance criteria for each lightning condition and alert status.
  - Review procedures for parking up and alighting from vehicles.
  - Do not treat vehicles with windows closed as safe shelter within the lightning management response plan, unless no practicable alternative exists.
- Evaluate and revise park-up area controls and safety measures as required.
  - Review the proximity and orientation of haul trucks relative to workers and buildings during lightning events.
  - Assess wall or windrow height and composition for the purpose of deflecting projectiles from tyre explosions.
  - Refer to AS/NZS 1768:2021 *Lightning protection* for guidance on air terminals, down conductors and earthing systems to reduce strike risk in park-up areas.

References and further information

Department of Local Government, Industry Regulation and Safety

WorkSafe

- *Hazard of lightning strikes on vehicles: Mines Safety bulletin no. 183*

Resources NSW

- *Lightning strikes stationary truck: Safety alert*

Resources Safety & Health Queensland

- *Court ruling: lightning hazards: Safety and health alert no. 462*

The University of Queensland

- *Assessing the risk of operating mining equipment during lightning storms*