

Safety Bulletin

Date: December 2022

Fires on battery powered tools increase

This safety alert provides safety advice for the NSW mining industry.

Issue

There has been a steady increase in the number of fires associated with portable tools that use lithium-ion and lithium polymer batteries as an energy source.

Lithium-ion and lithium polymer batteries are the preferred energy source for portable tools due to the high levels of energy that the batteries provide. However, this introduces the risk of fire or explosion when batteries and battery charging equipment are not used according to the manufacturers' safety directions.

Batteries can enter a state of 'thermal runaway' when subjected to over-charging, damage or abuse. Abuse includes dropping, crushing, piercing, or being subjected to vibration or higher than normal temperatures from external heat sources. Depending on the state of charge of the battery, thermal runaway may lead to rupturing the battery cells with subsequent fire resulting in the complete destruction of the battery, or the production of a vapour cloud with significant explosion risk and toxic gases. Any subsequent fire or explosion may place people at serious risk of injury and also result in damage to other plant and materials.

The Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 Schedule 2 (3) Electrical Engineering Control Plans section 2 requires the control plan to set out control measures for the risk to health and safety from the occurrence of uncontrolled fires.

Incidents

Incidents of lithium-ion battery fires that have occurred include:

- a lithium-ion battery caught fire while being transported in a tool bag in the back of a work utility at an open cut mine. The battery was free to move within the tool bag and was possibly short circuited.
- a lithium-ion battery caught fire while connected to a charger in an underground mine. The fault was identified as being caused by moisture ingress, which led to thermal runaway of the battery.
- a lithium-ion battery was left unattended on the back seat of a utility. The inside temperature of the vehicle exceeded the maximum recommended temperature for the battery and resulted in the battery catching fire.
- a lithium-ion battery caught fire when run over after falling out of a man basket in an underground mine.

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Figure 1 - Damage to battery after being run over



Figure 2 - Tool left unattended in vehicle



Figure 3 - Example of a well laid out charging station



Recommendations

- Only use charging equipment recommended by the manufacturer for that particular battery.
- Ensure that transporting of spare batteries does not expose them to risk of physical damage or short circuit of the connecting pins.
- Do not expose batteries to water as this can cause a short circuit between the battery connections.
- Do not expose batteries to temperatures greater than 50°C, or as recommended by the manufacturer. It should be noted that temperatures inside a vehicle can be much greater than external ambient temperatures. For example, the internal temperature of a vehicle left with

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windows up with an ambient temperature of 35°C can reach 60°C in 60 minutes. The temperature in an open cut mine in full sun can be up to 10°C higher than surface temperatures. These factors need to be considered when transporting and storing batteries in vehicles regardless of whether they are attached to a tool.

- Follow manufacturers' safety instructions.
- Have systems in place for managing the use of lithium-ion batteries including tracking of where batteries are being used and who is in control of the batteries, pre-use inspections, regular maintenance inspections, and training of personnel in how to respond in event of emergencies.

Additional reading:

- [How can I prevent my devices or batteries from catching fire?](#) (Fire and rescue NSW)
- [Powered tool battery fires](#) (NT Worksafe)

Note: Please ensure all relevant people in your organisation receive a copy of this safety alert and are informed of its content and recommendations. This safety alert should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's common area, such as your notice board where appropriate.

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