

SAFETY ALERT

DATE: APRIL 2019

Non-metallic materials add fuel to underground truck fire

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

Issue

A fire occurred on an agitator truck in an underground metals mine in Cobar on 13 April 2019. The fire spread quickly with non-metallic engine covers and guards adding to the fuel load and the intensity of the fire. 19 workers underground at the time had to retreat to refuge chambers while the fire was brought under control.

Circumstances

The truck's fuel tank was punctured, allowing diesel fuel to escape. The truck was being driven down the decline. At a local up-grade, the operator noticed additional drag on the engine and towards the top of the local climb the operator discovered a fire. The operator managed to escape from the truck without injury.

Figure 1 and 2: Damaged fuel tank with non-metallic cover consumed by fire



Key issues

Several issues have emerged from the event that concern the NSW Resources Regulator.

The fire suppression system nozzles were only targeting hot surface ignition in the engine bay. The truck contained substantial non-metallic fuel loads adjacent to the engine bay, in sound suppression materials, and in the operator cabin, and the suppression system was not capable of extinguishing the fire.

Non-metallic, non-fire resistant materials were used for covers, guards, and components.

Several components exploded as the fire took hold. Workers reported to have heard three explosions, which may relate to the three hydraulic accumulators on the truck.

Toxic products of combustion were distributed throughout the mine by the ventilation system.

The hand-held extinguishers mounted on the machine were not readily accessible to the operator from the cabin or as they dismounted the vehicle

Wheel chocks for the machine were not readily accessible to the operator after it caught.

Services installed in the decline were damaged by the fire. It is believed that a melted water line doused the fire.

Figure 3: Damage to the burnt guards and bonnet



Figure 4: Non-metallic materials in cabin affected by fire



Investigation

The investigation into the circumstances of the fire is continuing.

Recommendations

The NSW Resources Regulator recommends the following:

Vehicles used in underground mines must be rigorously assessed with regard to the risk of fire. A recent [assessment program](#) focussing on the contribution of maintenance practices to plant fires in open cut mines identified significant deficiencies with regard to fire risk assessments.

Designers should minimise the use of non-metallic materials that burn and produce toxic emissions.

Trucks that are not specifically designed for underground conditions may require further scrutiny to assess the content of non-metallic materials. Following are key points for consideration:

- Flammability of non-metallic components.
- Consideration of the toxic products of combustion.
- Location of flammable components relative to heat sources (for example turbo and exhaust systems).
- Fire suppression to stop fire from spreading to flammable components.
- Location of hand-held extinguishers to allow for ready access.

An assessment of material properties and parameters should include material quantities, flammability characteristics, and in the event of a fire, the heat release rate and toxicity of products of combustion.

The surface temperature of engine and electrical components must be measured to evaluate the risk of ignition.

MDG15 provides detailed on guidance on fire prevention and protection for mobile plant, including specific considerations for fire risk assessments and the use of fire-resistant materials for covers and guards.

[MDG 3608](#) also provides guidance for use of non-metallic materials in underground coal mines, and shows test methods that establish flammability, ignitability and toxicity. Cone calorimeter test results for materials can be used to estimate heat release rate properties. (e.g. 0.2 MW/m² heat release rate for a large mining tyre).

Trucks that are not specifically designed for underground conditions may require further scrutiny to ensure that there is suitable protection from ribs/walls for fuel and hydraulic tanks.

The fire suppression system design should include reasonable provision to cover non-metallic materials where these materials are used.

The position and method of securing wheel chocks and fire extinguishers on vehicles must be considered by the designer. A test deployment in a simulated fire emergency situation should be carried out to validate the design.

The number of fires on mobile plant in underground metalliferous mines is of significant concern to the NSW Resources Regulator. Our position is that all fires on mobile plant are preventable, subject to:

- the consideration and application of appropriate engineering controls in equipment design, as detailed in MDG15, including the use of fire-resistant materials and fluids
- a rigorous approach to assessment of fire risk
- effective implementation and ongoing monitoring of controls identified in fire risk assessments, and
- stringent monitoring and quality control of maintenance and repair activities.

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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