# Safety Bulletin

Date: November 2023

## Incidents show poor response to tyre fires on heavy earth moving machinery

This safety bulletin provides advice for the NSW mining industry.

### Issue

Following recent incidents, the Resources Regulator has identified a lack of preparedness and appropriate responses to tyre fires on heavy earth moving machinery at some mining operations.

When heavy earth moving machinery tyres are exposed to heat and fire conditions, additional risks are introduced that need to be considered and controlled appropriately. (Other pressure vessels located on mobile equipment should also be considered in this regard when preparing for and responding to equipment fires as well). When heated, heavy earth moving machinery tyres are susceptible to unplanned explosions. Debris from these explosions can be projected several hundred metres causing severe injury or death. Tyres can become unstable without warning and can remain an explosion risk for up to 24 hours.

### Circumstances

The NSW Resources Regulator has noticed different approaches that mine operators were taking when responding to heavy earth moving machinery fires, particularly when the machinery tyres were involved.

#### Incident 1

Figure 1: Hyundai 780-9HL loader fire

Figure 2: Hyundai 780-9HL loader fire

A front-end loader was operating at the tip face of an open cut mine when operators noticed a loss of power. Subsequently, a fire started on the machine.

Regulator inspectors found the mine did not have a good working knowledge of the risks associated with heavy machinery tyres when exposed to heat and fire conditions.

Because of this, the response to the incident involved staff entering an area that should have been declared an exclusion zone for worker safety. The mine did not implement its emergency procedures/plan adequately.

The mine operator's training and response plans did not identify or control the risks of a tyre explosion because of fire or heat. Although eventual exclusion zones were established, they were primarily for investigation and HAZMAT purposes.

Multiple staff members including watercart operators entered the exclusion zone to take photos, monitor or conduct firefighting operations. Figure 2 shows the watercart parallel to the loader and within the hazardous zone.

## Incident 2

Figure 3: Caterpillar 773F service cart fire

A fire on a broken down service cart that was being towed occurred, as part of a recovery operation at an open cut coal mine. The mine operator called an emergency, attempted initial firefighting operations, removed exposures from the vicinity and then withdrew and placed an exclusion zone around the fuel cart of 300 metre for 24 hours.

No additional people were placed at risk and the potential danger was mitigated.

## Incident 3

Figure 4: Komatsu 830E dump truck fire

A rear dump truck was being operated at a dump on an open cut coal mine. The truck caught on fire while on the dump and flames quickly engulfed the cabin. Fast notification from a nearby dozer operator and calm instructions enabled the trainee operator to exit the vehicle unharmed.

An emergency was called and response teams with watercarts attended the scene and extinguished the fire. The cabin-operated fire suppression system was not successfully initiated by the operator.

The dangers of hot tyre fires were not initially considered within the emergency response, and watercarts tried to extinguish the fire in close proximity to the tyres in a forward-facing orientation. Once the risk of tyre fires was communicated, watercarts approached the dump truck in reverse at 45-degree angles, still inside the exclusion zone.

The mine operator had thermal imaging temperature monitoring available, but it was not used for throughout the response phase of the incident. A supervisor activated the external fire suppression on the truck's bumper after approximately 42 minutes after the fire began, placing themselves in close proximity to the hot tyres.

## Recommendations

It is recommended that mine operators:

- review their emergency plans, emergency response procedures and training to ensure that the risks involved in firefighting heavy machinery tyre fires are considered along with exposure of pressure vessels to heat.
- Review their procedures and training clearly defining the risks and controls to be implemented.

Controls include minimum safe distances established by exclusion zones, exclusion times of at least 24 hours and firefighting procedures that allow for a safe approach. This advice should also be communicated to any external agencies called to the mine to conduct firefighting or emergency operations and form part of the emergency response plan.

All mine operators should also consult with the relevant fire authorities Fire and Rescue NSW and the Rural Fire Service.

In addition, coal mines should also consult with Mines Rescue when developing these response plans, and when implementing training programs. Underground and coal mines must incorporate recommendations from these emergency services in their emergency management plans.

### Firefighting

First aid firefighting, including onboard suppression systems can quickly deescalate a fire and contribute to significant reduction in machinery loss. Workers should be trained in the correct operation of onboard suppression systems and first aid firefighting.

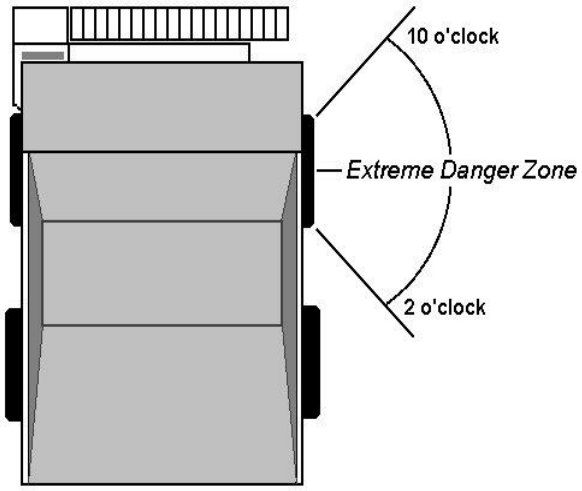
However, once the tyres are affected workers must withdraw and use more appropriate methods to extinguish fires, including setting up exclusion zones and allowing the fire to self-extinguish. The safety of workers and responders is paramount, and personnel should not be committed inside the exclusion zone. Other equipment or items that may be impacted by the fire should be protected at a safe distance where possible.

If watercarts are to be used in a fire response, they should be parked at a safe distance and angled to protect the cabin from projectiles. The explosive force of a rapid tyre explosion has enough

energy to cause a projectile to penetrate vehicle cabins. This should be considered in developing response plans. Safe approach outside blast zones from maximum distances should be used and responders should avoid entering pre-determined exclusions zones for firefighting operations.

Using remote firefighting techniques, monitors and branches that allow for maximum throw (like stacked tip nozzles) should be considered. Flow rates and pressures should be adjusted in combination with appropriate equipment and techniques to allow the firefighting operation to be conducted outside exclusion zones, ensuring a safe approach. Figure 5 depicts typical danger zones from tyre explosions, however due to the variability in circumstances this should be used as a guide only.

Figure 5: Designated extreme danger zone




## Evacuation

Operators should be trained and familiar with the safest evacuation routes off their vehicles if they catch on fire. These procedures should avoid the designated extreme danger zone as shown in Figure 5.

## Re-entry

If a fire watch or photos of the incident are required, it is recommended that workers do not enter any exclusion zone and instead use appropriate technology such as drones, telephoto lens, zoom or binoculars to monitor the vehicle after the fire. Thermal imaging, onboard systems and infrared thermometers can be used to determine if internal tyre temperatures are stable or increasing as an additional safety measure.

**Note:** Please ensure all relevant people in your organisation receive a copy of this safety bulletin and are informed of its content and recommendations. This safety bulletin 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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