

## Safety Alert



# Preventing mobile plant fires

This Alert highlights the danger of mine workers being exposed to mobile plant fires and provides recommendations to reduce or eliminate fire risks.

November 2012

## Background

Since January 2010, there has been 23 incidents involving fire on mobile plant at mines in Victoria - 19 occurred in underground mines and four in open cut mines.

Typical causes of fire include component failure and/or dequate maintenance.

## Identified causes

The common contributing factors were failure to maintain:

- integrity of pressurised hydraulic hoses
- hydraulic lines clear of heated surfaces (inadequate clearance or insulation)
- sources of oil leaking onto hot engine components
- hose type, transmission coolers and power train components to manufacturer's requirements
- brake fluid lines from overheated brake friction material issues
- hydraulic, mechanical and electrical components on a regular basis
- tyres to manufacturer's requirements
- build-up of material between hoses and heated surfaces, nence allowing thermal conduction and ignition

Other factors included failure to:

- respond to overheating issues with engine turbochargers
- exactly locate and determine the source of the original reported fire that occurred hours earlier on the plant
- reset/recalibrate auto-fire suppression system immediately after initial activation.



*Damaged lead insulation connecting from engine to auto-shutdown box. System shorted on adjacent hydraulic hose metallic covering and ruptured the return hydraulic line.*

## Preventative control measures

### Design

- Ensure hydraulic components are 'like for like' and considered suitable for use. Always consult plant manufacturer before making changes.
- Ensure any contractor installations/design modifications that are undertaken off-site are verified on-site by the employer before use and are equivalent to manufacturer's standards and design.
- Implement quality checks by manufacturer-authorized service providers periodically as a cross check for internal maintenance.
- Evaluate potential alternative higher flash-point manufacturer-approved hydraulic oils, which contain Polyol Ester based fluids, phosphate esters or water glycol and emulsions. Such fluids must be compatible to the existing in situ components such as seals/fittings.

### Installation

- Properly fit any attached or in situ hoses with approved manufacturer components.
- Maintain hydraulic equipment with the appropriate fit-for-purpose tools.
- Routinely check hose clamp type.
- Use fire resistant anti-static hoses whenever possible and consider high temperature tolerant hoses designed for oil operating temperatures >150 °C.

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- Install and evaluate insulation around hot components or insulate hoses near hot components and upgrade to braided armour type hoses.
- Ensure wiring is protected against fire, and connections are appropriate to manufacturer's requirements and suitably located.
- Consider the location and rating of protective devices such as fuses, solenoids and non-return valves.

### Inspection and maintenance

- Complete pre-start checks for locating and acting on oil leaks, sprays and stains.
- Ensure the maintenance work order system includes the correct selection integrity and testing of control measures.  
Use thermal imaging equipment to detect hot spots and high temperature areas of plant during maintenance programs.
- Ensure high current wiring is not in close contact with hydraulic hoses.
- Routinely wash, clean and check hoses for any sources of rubbing, oily mist or leaks.
- Carry out periodic checks on hydraulic braking systems to ensure sound operation, including bearings brake drums, rotor and callipers.
- Routinely check electrical wiring including insulation.
- Routinely check solenoid connections for corrosion and replace/check at set engine hours or as per manufacturer recommendations. Consider protective devices for solenoids such as fuses.



*Hydraulic hose from turbocharger on haul truck ruptured by its heat shield cover. The incorrect placement of the shield caused continual abrasion of the outer metal hose sheath and fluid spray onto hot engine components.*

### Emergency response

- Install fire detection and automatic fire suppression on plant that is used in high risk zones and install engine auto-shutdown systems that operate when the fire suppression system is discharged.
- Ensure communication of fire-related events, maintenance incidents and subsequent attendance and associated follow-up is clear to employees.

### More information

- Australian Standard 5062–2006 - *Fire protection for mobile and transportable equipment* (it has useful and practical information on fire management including: fire types, ignition sources, potential fire hazard locations, and fire analysis and fire protection systems).
- ASTM E659 78 (2005) - *Standard test method for auto ignition temperature of liquid chemicals*.

### Contact details

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For more information on occupational health and safety, go to WorkSafe's website: [worksafe.vic.gov.au](http://worksafe.vic.gov.au)

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