



# Equipment fires, investigation and response

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The Mines Inspectorate's concern over the number of equipment fires on mines has been expressed in Safety Alerts and Safety Bulletins. However, industry needs to take assertive action to reduce this hazard: the risk of machine operators being caught in a fire is unacceptably high. In most cases, the machine's fire suppression system operated, allowing the operator to escape the machine without serious injury. However, this alone is not an adequate control.

## Causes of fires

Mines' investigations found fires resulted from fuel line abrasion or loose fittings (leaking Orings) on the flexible fuel supply and fuel return hose system running in and around the engine. The fuel leaked or sprayed on to hot metal on the engine causing the fire. Hose routes, hose retention and the proximity of hot metal were major contributing factors to these incidents.

Engine bays have many areas where fuel lines are subject to abrasion, including:

- hose to hose and hose to firewall contact
- hose to clamp or retainer contact
- hose to component contact.

## What industry can do

Fire investigations have highlighted areas of potential improvement that would increase the effectiveness of recommendations made below, including:

- the condition of hoses, pipes and their clamping arrangements
- the routes past hot surfaces
- the lack of shielding between hot surfaces and pipe work carrying flammable fluid
- the reluctance to involve external expertise.

In any equipment fire investigation, mines that involve the manufacturer or their agent can gain expert content advice, while allowing manufacturers or suppliers to identify commonalities which may lead to design changes or preventative actions that need to be communicated to their customer user groups.

This will enable the manufacturer to provide advice to industry; in accordance with the obligations of manufacturers and suppliers stated in Section 44 of the *Coal Mining Safety and Health Act 1999*, and Section 41 in the *Mining and Quarrying Safety and Health Act 1999*.

## Good practice



Notable examples of industry positively responding to such incidents include recent action by Hastings Deering in response to fires in the last eight months in Central Queensland coal mines. The fires involved Caterpillar D-11-T and Caterpillar D-10-T track dozers fitted with C series engines.

Hastings Deering published a safety bulletin in July 2006, (updated in August 2008) on the causes of system pulsation and hose abrasion. The solution then was replacement of the steel tubing fuel line with a flexible hose and installation of new P-retaining clips to eliminate cavitation erosion.

Based on subsequent events, a further Safety Bulletin, *External SQM 51 D11T Fuel lines 9/8/11* advised fuel line inspection as a preliminary action until a planned modification has been designed and tested. Planned modification includes replacement hoses covered by an external abrasion resistant sleeve, then by a fire-resistant sleeve. Trialling of the modification 'kit' is underway at time of going to press, with rollout to industry to follow.

The Hastings Deering investigation and planned action response included historical reports so root causes of recent and past fires were considered. The design and installation of hose and pipe layouts were examined to ensure:

- elimination of contact and abrasion
- minimisation of proximity to hot metal, or
  - provision of mechanical or
  - heat-resistant protection
- implementation of a change-out regime that assumes a reduced life cycle for hoses carrying flammable fluids.

**Authorised by Gavin Taylor - Chief Inspector of Coal Mines**

**Contact:** [minesafetyandhealth@dnrm.qld.gov.au](mailto:minesafetyandhealth@dnrm.qld.gov.au)

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