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Fires on mining equipment

This technical bulletin highlights the importance of inspection and maintenance to reduce fire risks in all plant and equipment in extractive operations.

Background

Worksafe's High Hazard Unit has recently been notified of a series of events involving fires starting on plant in the extractives sector. Most of these incidents have been at mining operations, and many have been attributed to component failure and/or inadequate inspection and maintenance.

Contributing factors include:

- inadequate maintenance and inspection systems
- hydraulic oil, engine oil, or coolant mist contacting hot engine areas.
- build-up of combustible material (lubricant, fuels, rags) near heat or ignition sources
- bearing failures causing friction and fire.

ineffective isolation of ignition sources such as battery terminals. Fire is a critical risk in the extractives industry and must be addressed through effective controls and effectiveness monitoring. Critical risk controls must be understood by all personnel and applied without exception to ensure everybody's safety.

Incidents

1. A starter motor on a surface excavator at a mining operation caught fire during the pre-start inspection. The starter motor driver gear did not disengage from the drive ring. This caused the engine to drive the starter motor until it ignited. The fire was extinguished by the operator using an on-board portable fire extinguisher.
2. The operator of an underground loader noticed the lights starting to dim. On inspection flames were seen coming from under the battery cover. A metal cover holding the batteries in place had become loose causing the batteries to arc, causing the fire. The machine was isolated and the flames were extinguished.
3. Fire started in the engine bay of an underground truck. An O-ring seal had failed in the pressurised hydraulic steering pump hose causing oil to spray onto the hot surface of the manifold.
4. Following maintenance, a cleaning rag was inadvertently left in the engine bay which then caught fire. The fire suppression system was activated and extinguished the fire.
5. The turbo feedline on an underground haul truck was rubbing against the turbo coolant feedline causing the oil feedline to wear through. Oil sprayed onto the hot turbo causing a fire.
6. The failure of mono pump drive bearings caused a bearing locknut to rub against metal housing. The resulting friction, heat, and spark from metal on metal contact ignited grease in the housing.
7. An underground ventilation fan was started using the start panel on the fan control board. To avoid damaging the vent tubes the operator then attempted to stop the fan using the E-Stop to 'pulse start' the fan. When it didn't stop, the operator isolated the starter panel. No abnormalities were found in the fan panel when inspected. The main isolator was then closed which immediately started

the fan, and smoke and flames began coming out from the panel door. The probable cause of failure was excessive current flow which caused overheating of the contactor within the fan starter panel.

8. A return line on an engine coolant system was replaced with an undersized line. The undersized line caused a back-up of coolant fluid in the reservoir that led to a spray mist of coolant that caught fire.

Controls

The following steps should be taken to ensure the risk of fire is eliminated or minimised:

- Systematically inspect all components in hydraulic systems, including engine oil supply, fuel, and coolant supply circuits, during routine part replacements.
- Proactively monitor hydraulic hoses including checks on connections, clamps, and pressure relief valves.
- Regularly clean equipment.
- Adopt a risk-based hydraulic hose management system.
- Engage manufacturers or authorised service providers to perform quality checks on top of your regular maintenance.
- Isolate potential engine heat sources and insulate hoses near hot components where possible.
- Routinely inspect electrical systems for corrosion or insulation fatigue.
- Consider the location and rating of protective devices such as fuses and wiring control.
- Install, maintain, and systematically inspect fire detection and automatic suppression systems on vehicles or plant.
- Install portable fire extinguishers on all mobile plant.
- Train all mobile plant staff on hydraulic hazards, fire detection, and response procedures.

Further information

Our website has further guidance on overlapping duties and risk management: [worksafe.govt.nz](https://www.worksafe.govt.nz)

- [MDG 15 – Guideline for Mobile and Transportable Equipment for Use in Mines](#)
- [ASNZ 3584 – Diesel Engine Systems for underground coal mines – Fire protected - Heavy Duty](#)
- [AS 5062 – 2006 Fire Protection for Mobile and Transportable Equipment](#)
- [MDG 1032 – Guideline for prevention, early fire detection and suppression of fires](#)
- [NIOSH IC 9467 – Analysis of Mobile Equipment Fires for all US surface and underground coal and metal/non-metal mining categories 1990-1999](#)
- [RR980 – HSE Generation of flammable mists from high flashpoint fluids](#)