NSW GOVERNMENT

NSW Resources Regulator

SAFETY BULLETIN

DATE: DECEMBER 2021

Fires occur after servicing mobile plant

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

Issue

The NSW Resources Regulator has recently identified a number of incidents involving fires on mobile plant (FOMP) which have occurred shortly after maintenance and repair activities. Further analysis identified poor workmanship and human performance were key contributors to fires occurring on mobile plant in both the short and long term.

Figure 1: Cause still under investigation

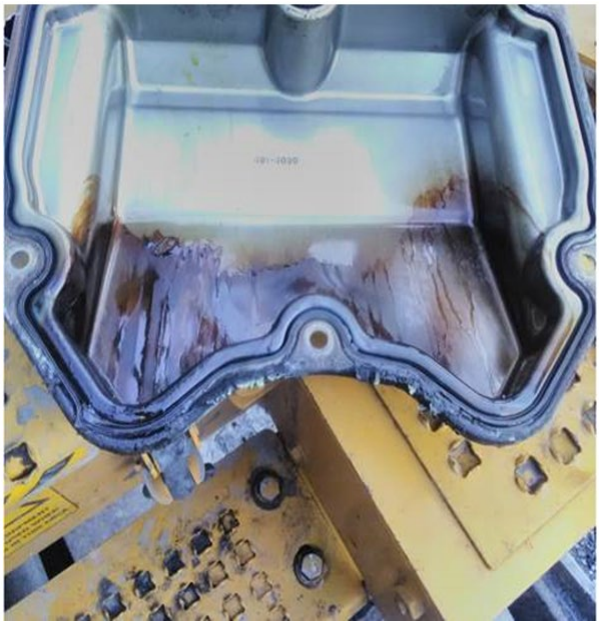
Incidents

Eighteen incidents occurred at open cut coal mines from the 21 April to 21 October 2021 with contributing factors involving the characteristics described above.

Common themes or causal factors of fires included:

- painted components such as exhaust manifolds and turbochargers released volatile vapours which ignited during initial start-up or commissioning
- oil leaks from valve or rocker cover gaskets caused by:
  - failure to install fasteners
  - over-tensioned or under-tensioned fasteners
  - failure to replace gaskets with new gaskets
  - failure to install gaskets correctly (pinched on assembly)
- lagging which had absorbed oil and was not replaced or cleaned effectively
- diesel fuel connections or fittings disturbed during engine replacement or repairs not sufficiently tensioned before returning the plant to service
- failure to re-install fuel line clamps and support brackets leading to fatigue and release of diesel fuel
- failure to clean out blind threaded holes on transmission oil filter cover leading to loss of fastener tension and release of oil
- failure of exhaust lagging to form an effective isolation barrier between ignition source and fuel source
- ineffective exhaust lagging to separate heat source and fuel source
- over-tensioning of positive terminals of starter motors and lubrication pump motors causing damage to insulation, resulting in creation of an ignition (heat) source
- the arc chute of the grid blower contactor was not fitted correctly after a service causing a fire in drive system cabinet of electrical wiring.

Figure 2: Fire affected rocker cover



Analysis

Of the 18 fire incidents:

- one occurred during commissioning
- nine occurred within the first shift of the plant being returned to service
- ten occurred from errors in workmanship likely to have been detected by visual inspection by a supervisor or a short period of workshop commissioning.

All of the fires in the group occurred at open cut coal mines.

One third of these fires occurred at one single mine.

All fires could be categorised as minor fires and did not result in personal injury. However, slight changes in circumstances could result in larger volumes of fuel available, increasing the severity of fire.

Data in relation to surface mining equipment presented over many reports by the Resources Regulator would support:

- release of fluids such as engine oil, hydraulic oil and diesel fuel is reasonably foreseeable
- high surface temperatures from exhaust and turbo chargers are dominant ignition sources
- the likelihood of the hazard (fire) occurring is very likely if a release of engine oil, hydraulic oil or diesel fuel occurs in or near the engine bay.

Comments

OEM and aftermarket barriers and lagging solutions offer some protection but are regularly found to be ineffective in preventing a fire.

This places a greater emphasis on not only preventative maintenance strategies but also the quality of workmanship and prevention of human errors. Even highly trained and competent tradespersons make slips, lapses or errors in judgement from time to time.

Supervision and post service inspections and commissioning is useful in confirming quality workmanship and detecting faults prior to return to service but has limitations.

Recommendations

Mine operators and equipment owners should ensure:

- appropriate tools and procedures are available and used for all maintenance and repair activities involving torque critical fasteners
- systematic processes such as 'X' markings are used to account for fasteners being installed and tensioned to the final assembly torque
- maintenance workers are trained and supported to inspect and replace lagging which may be contaminated by flammable liquids
- maintenance systems adequately resource and prioritise maintenance activities to be performed
- supervisors are trained and permitted the time to make an effective review of the critical work undertaken by tradespersons under their direct supervision
- where equipment is released back into service with defects, the health and safety hazards associated with the failure of the defective component have been identified and controls implemented
- maintenance practices and culture are conducive to reducing human errors through:
  - a systematic approach to disassembly and reassembly
  - good storage and housekeeping
  - spare parts availability
  - effective communication time and handover notes between shifts.

Mine operators and equipment owners should review the effectiveness of their 'Return to Service' assessment worksheets and consider a follow up 'spanner check and inspection' after a short period time (i.e. one to two hours) after return to service based on risk of maintenance undertaken.

It is recommended engine suppliers and repairers should:

- review paint systems used on overhauled engines and components to eliminate potential for volatile fumes to be emitted on initial start-up.

Equipment designers, manufacturers and suppliers should:

- Carry out a review of their current controls in relation to hazards associated with fires on mobile plant. The review should:
  - consider previous incidents associated with mobile plant fires
  - identify all potential fuel and ignition sources
  - identify and measure maximum operating surface temperatures
  - identify the controls to be implemented in accordance with the hierarchy of controls
  - take into consideration human factors.
- Install effective shielding between pipes / hoses and any adjacent components which have an operating surface temperature higher than the auto-ignition temperature of the fluids that may spray onto the hot surface. For example, fire walls, deflective guarding, lagging etc.
- Provide end users the necessary information to maintain equipment in a safe state. This should include component replacement frequencies or their replacement criteria.
- Make readily available all safety related updates or recalls for their equipment to all owners of equipment. Consideration to be given to change of owners or contact details.

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.

Visit our website to:

- find more safety alerts and bulletins
- use our searchable safety database
- sign-up to receive mine safety news.

Other relevant resources

- Fires on mobile plant quarterly reports
- Fires on Mobile Plant at Open Cut Coal Mines – Planned Inspection Consolidated Report
- Preventing Fires on Mobile Plant Position Paper
- SB21-01 Fires occur while refuelling plant
- SB15-03 Fires ignite while refuelling mobile plant with quick-fill fuel systems
- SB13-05 Too many underground fires

DOCUMENT CONTROL	
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