

SAFETY BULLETIN

DATE: MARCH 2021

Fires occur while refuelling plant

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

Issue

Since August 2017, a total of eight fires have occurred while equipment was being refuelled. In the past six months, the NSW Resources Regulator has been notified of three fires occurring on mobile plant during the refuelling activity, where the cause or significant contributing factor was the failure of the level control breather assembly.

Despite recommendations provided in a safety bulletin previously issued (SB15-03), fires and other related incidents are continuing to occur while workers refuel plant at NSW mines.

Figure 1 - Fire occurred during refuelling



Incidents

In one incident involving a rear dump truck at an open cut coal mine, the breather check valve did not close and allowed the tank to over fill. This enabled diesel fuel to escape from the breather and ignite on contact with nearby hot engine parts.

In two other incidents at an open cut coal mine, fuel escaped from the vacuum vented fuel tank cap (splash fill point) on identical model graders after the tank was overfilled and pressurised, resulting in a fire.

In another incident, an underground metalliferous mine dump truck also had fuel escape from a diesel tank breather and ignite after spraying onto hot engine parts while being refuelled at a surface refuelling area.

All the incidents mentioned used dry break refuelling systems.

Other refuelling incidents resulting in fires have been caused by leaking fuel delivery hoses, cracked fuel tanks or poor decanting methods. Ignition sources were generally hot engine surfaces although one may have been static electricity.

Figure 2 - Level control vent and filler cap



Investigation

Contributing factors identified by the Regulator after reviewing the incidents include:

- mechanical failure of fuel tank level control vent assembly
- inaccurate fuel gauges
- placement of fuel tank vent breather valve near hot engine components
- over pressurisation of the fuel tank by the fuel delivery system
- leaking of the fuel cap where the leaking fuel can flow by gravity or be blown on to hot engine parts
- cracked or leaking fuel tanks or delivery hoses
- inadequate decanting methods or decanting equipment that was not fit for purpose.

Recommendations

It is recommended mine operators and equipment owners should:

- Develop an asset list of all fixed and mobile plant that require refuelling with liquid hydrocarbon (e.g. diesel, petrol) products.
- For the identified plant:
 - assess the fuel tank breather location to ensure escaping fuel is directed safely away from hot surfaces and other potential ignition sources
 - inspect or test the fuel tank cap to confirm it is fit for service and able to remain liquid tight for expected service pressures from the fuel delivery system
 - inspect the fuel tanks for damage including cracks or leaks. Fuel tanks constructed of non-ferrous material may be more susceptible to fatigue cracking
 - inspect fuel level gauges are installed and reading accurately.
- Review maintenance management systems to include lifecycle maintenance of fuel tank level control vent assemblies and fuel tank caps. The maintenance regime should consider the OEM recommended actions and site operating environmental conditions.
- Review refuelling systems to ensure that they do not exceed design limits for flow and pressure for the fuel tanks installed on the plant.

- Contact equipment suppliers for product improvements available regarding breather relocation options or other fire prevention improvements.
- Conduct an inspection of the fuel storage and refuelling delivery equipment to assess:
 - fuel delivery hoses and quick fill couplings are fit for service
 - support booms, support chains and break-away safety devices are fit for service
 - no unauthorised alterations have been made
 - make-shift adaptors and work arounds are not present
 - the refuelling procedure is appropriate for all expected plant to be refuelled at the depot and all identified risk controls remain effective
 - firefighting equipment is available, appropriately located and maintained ready for use.
- Where refuelling is by means of traditional bowser nozzle or container and funnel via the fuel tank filler cap opening:
 - bowser cut out functions are working effectively
 - hazards associated with refuelling of plant immediately after operation which are still hot have been identified and managed
 - instructions for fuel spill recovery are available and detail clean up and restart processes.

It is recommended equipment designers, manufacturers and suppliers should:

- Review the design of plant to ensure fuel tank breathers, vents and caps are located such that any fuel released is directed safely away from hot surfaces and other potential ignition sources.
- Potential mechanical failure modes and reasonably foreseeable human errors are considered in the design of fuel tanks, caps, vents and refuelling processes.
- Provide adequate information regarding the inspection, testing, specifications and lifecycle recommendations, so the onboard fuel storage system may be used and maintained to be without risk to health and safety when used for the purpose for which it was designed.
- Introduce product improvements to refuelling systems with regard to fire prevention are offered to customers.

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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Other relevant resources

[SB15-03 Fires ignite while refuelling mobile plant with quick-fill fuel systems](#)

[SB13-05 Too many underground fires](#)

Mount Arthur Refuelling Fire [Video](#) and [Investigation Report](#)

[Fires on Mobile Plant – Guidance Material and Quarterly Reports](#)

[Fires on Mobile Plant at Open Cut Coal Mines – Planned Inspection Consolidated Report](#)

[Preventing Fires on Mobile Plant Position Paper](#)

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