



SAFETY ALERT

Diesel Engine System Running on Atomised Hydraulic Oil

INCIDENT

An explosion protected diesel engine system (DES) in use at an underground coal mine continued to run on and was unable to be shut down after the diesel fuel was switched off. The interim emergency shutdown system, Carbon Dioxide (CO₂) extinguisher had to be operated to shutdown the diesel engine system.

CIRCUMSTANCES

While driving an articulated loader (LHD) underground the operator noticed an oil mist coming from within the engine compartment. The operator drove the vehicle approximately 50m to the underground diesel garage, where he attempted to shut down the diesel engine system. The engine would not shut down, even when the diesel fuel was shut off.

The diesel engine continued to run on atomized hydraulic oil or vaporized oil. The engine revved higher when the diesel fuel was switched off, and large amounts of smoke were emitted which filled the immediate area around the vehicle.

The operator used the CO₂ extinguisher located on the LHD (as recommended in SA05-08) and applied it to the air intake to stop the diesel engine, as per the site training on emergency shutdown on diesel equipment.

The area was inspected and tested for any flammable gas, none detected.

A tube bundle gas monitoring point near the area registered an 80 ppm Carbon Monoxide (CO) sample.

The operator reported the incident to the shift under manager, and senior management and the Department of Primary Industries were notified. A mechanical tradesperson inspected the vehicle, cleaned down the vehicle engine and transmission compartment. The defective hose was identified, replaced and the vehicle was inspected for other problems.

The air intake was inspected; the intake flame trap was cleaned and refitted. The air filter housing was cleaned and air filter replaced. The vehicle was restarted and the safety system and shutdown system were checked and found to be operational. The machine was transported out of the mine for further inspections.

INVESTIGATION

The LHD was inspected and it was found that the steering pump output hose failed by developing a hole approx 5mm wide. This hole atomised the hydraulic oil creating a pressurised oil spray (mist) in the engine compartment and torque converter area.

Hydraulic oil covered the engine and centre drive shaft compartment. The air filter and intake flame trap were saturated with hydraulic oil.

The hydraulic hose was rated correctly for the application. The operator correctly followed the diesel emergency shutdown system as per the site training on Diesel Emergency Shutdown System interim controls using a CO2 extinguisher. The mine has scheduled the fitting of 'original equipment manufacturers approved engineering shutdown systems' when available.

This incident has highlighted that apart from methane enriched atmospheres other hydrocarbons when vaporized or atomized have the potential under certain circumstances to fuel a diesel engine and create a possible uncontrolled condition



Pin Hole in the hydraulic hose

RECOMMENDATIONS

For underground coal mines

1. This incident highlights the need for all explosion protected DES to be fitted with an emergency shutdown system.
2. In accordance with the Section 63A Notice issued by Senior Inspector of Mechanical Engineering on the 20 June 2005:
 - a) **All explosion protected DES operating in significant risk methane areas are required to be fitted with an approved emergency shutdown system by the 20 February 2006.**
 - b) **All explosion protected DES are required to be fitted with an approved emergency shutdown system by the 20 February 2007.**
3. The Safety Alert SA05-08 and the Section 63A notice should be reviewed.
4. The schedule for the installation of the approved emergency shutdown systems be implemented as soon as practicable.

All mines.

1. All mines should check the integrity of pressurised hydraulic or fuel lines in the vicinity of the engine compartment on a periodic basis.
2. Where appropriate fuel and hydraulic lines should be shielded or routed away from hot surfaces or engine air intakes, refer MDG 15.
3. Fuel and hydraulic hoses or pipes that are damaged, worn or fatigued should be replaced immediately if they are located near the engine compartment

Signed



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