Department of Industry
Resources & Energy

Mine Safety

MINE SAFETY INSPECTORATE

INVESTIGATION INFORMATION RELEASE

High potential incident

Incident date 12 August 2015

Event Komatsu 730E dump truck crushes light vehicle

Location Ashton Coal Handling and Preparation Plant, Hunter Valley NSW

At a glance

A 180 tonne Komatsu 730E dump truck rolled onto a light vehicle. A person sitting in the passenger seat exited the light vehicle via the passenger door window as the truck rolled forward.

The incident occurred while workers were trying to jump-start the truck from a battery pack mounted in the tray of the light vehicle.

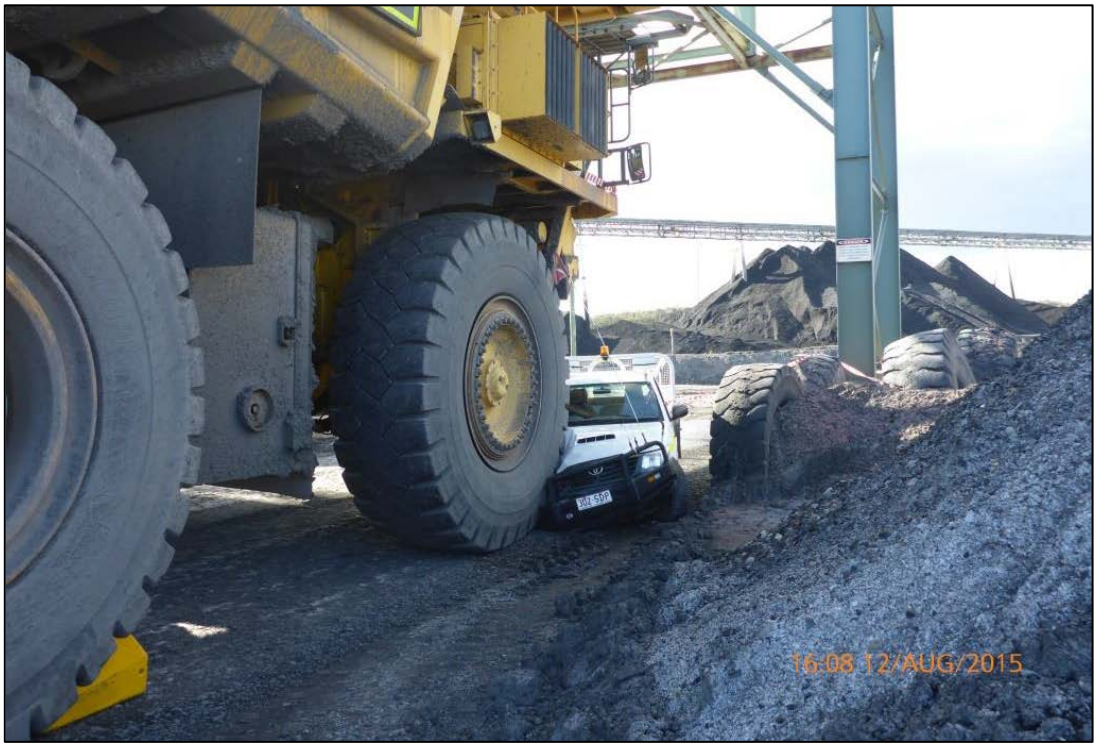

Figure 1: Photograph of incident scene - photograph by Mine Safety inspector.

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The incident

The incident occurred at 9.30 am at the entrance to the bottom of the washery reject bin.

Before the incident, the dump truck driver was operating the truck for about 1.5 hours, transporting reject material from the reject bin to a dump in an open cut pit.

While driving out of the pit, the operator of a passing grader told him via two-way radio that his truck appeared to have an oil leak on the left-hand rear wheel.

The operator drove to the reject bin, parked under it and called the workshop for assistance.

A mechanic was diverted to the truck to inspect the leak. He asked the operator to reverse the truck from under the bin and tried to undertake the inspection with the truck running while staying outside the footprint of the truck. He then asked the operator to shut the truck down because the blower fan in the axle box was blowing air out of the wheel cover.

The mechanic was concerned the leak was from the brake circuit, and decided the most appropriate course of action was to place the truck out of service and use another truck in its place. He left in his light vehicle and returned to the workshop to prepare a spare truck for service.

The operator returned to the cab of the truck with the intention of returning it to the workshop, but it would not start. He then tried to use the two-way radio to advise the mechanic but encountered issues with the radio so he used his mobile phone to call his supervisor to inform him of the problem.

The mechanic was contacted about the starting issue and returned to the reject bin in the light vehicle, accompanied by an electrician in the passenger seat.

The mechanic drove the light vehicle under the bin to get the light vehicle close enough to the truck to allow jumper leads to be connected. He then proceeded up to the truck cab and with the operator and checked for obvious issues that may have prevented the truck from starting. They again attempted to start the truck without success. The electrician remained in the light vehicle.

The mechanic then decided to try jump-starting the truck. He returned to the ground to connect the jumper leads from the starter pack on the light vehicle to the jump start receptacle in the battery isolator panel ahead of the right-hand front wheel of the truck. With the leads connected, the operator again attempted to start the truck unsuccessfully.

The mechanic then decided to test the starter motors on the truck using the starter motor test switch also in the battery isolator panel. When the mechanic tested the first starter motor, the truck started.

The mechanic immediately went back up the stairs to the truck cab and as he leaned in, he noticed the truck was moving forward. He shouted to the operator and both the operator and the mechanic attempted to stop the truck using the brake/retard foot pedal.

Realising the truck was moving onto the light vehicle, the electrician tried to get out the passenger door, which he had inadvertently locked. He quickly climbed out through the passenger window.

With the truck stopped, the mechanic left the truck cab and ran back down the stairs to check on the electrician.

The mechanic saw the crushed light vehicle and implemented the mines' emergency response procedure.

Investigation outcomes and observations

The preparation plant was operating at the time of the incident. A high demand is placed on the reject circuit. The reject bin fills quickly, up to three times an hour, and trucks are required to operate around the clock to ensure the plant keeps running. The mechanic was very aware of the potential impact on production if the bin was not emptied in time.

The operator reported he had applied both the park brake and the dump brake before shutting down the truck. The truck was tested extensively to determine whether there was a fault with the braking system. Apart from minor defects not directly impacting on the performance of the park brake circuit no faults were found, with the braking system performing to specification. Inspections and testing

was undertaken in accordance with the Komatsu procedures under the direction of a Komatsu representative and department inspectors present.

The tests confirmed that shutting down the truck engine automatically applied the park brake regardless of the park brake switch position, as the park brakes are spring-applied and rely on hydraulic pressure generated while the engine is running to keep them released.

Extensive checks were also undertaken on the truck electrical system, including the batteries, start and drive interlocks, with no faults identified.

The starter motor test circuit was examined, and it was identified this circuit bypassed all interlocks required to be healthy to start the truck normally, including the park brake switch interlock. A level of protection was afforded by the use of a timer relay to limit the amount of time the engine would crank during a starter motor test to two seconds. This circuit was installed by the mine in 2005 after the truck was bought in 2004.

The consequence of bypassing the park brake switch interlock in this event was critical. When starting the engine via the starter motor test switch, if the park brake switch was in the off position, hydraulic pressure would have been developed in the park brake circuit disengaging the park brakes and allowing the truck to roll forward.

The use of procedures to manage risks associated with mobile equipment is standard practice in surface mines. These include controls to manage the interaction of heavy and light vehicles and pedestrians. Typically these controls include:

- vehicles to be parked in a “fundamentally stable” position – meaning the vehicle should not move, even if the park brake is not applied. This may include the use of wheel chocks for vehicles that have broken down on ramps or grades.
- parking light vehicles in line of sight of heavy vehicle operators.
- heavy vehicles to be isolated before personnel enter the footprint of the machine.

These procedures were in place at the mine, however were not adhered to in this incident. In reversing the truck out from under the bin, it was left parked on a grade without the wheels being chocked. The vehicle was not isolated when the wheel inspection was undertaken. The light vehicle was also parked under the bin, which was also not in accordance with site procedures and warning signs.

Safety considerations

This incident highlights:

- the limitations of reliance on procedural controls without appropriate consideration of the impact and effect of human factors. A significant behavioural shaping factor in both the mechanic’s and operator’s actions was their knowledge that production would stop if the bin was not emptied.
- the importance of considering human factors in ergonomic design. In the absence of any fault, the most plausible explanation with regard to the truck moving was that the operator either overlooked applying the park brake, or believed he had applied the park brake and in fact had applied the dump brake. These brake systems are actuated by separate but basically identical switches mounted beside each other on the dashboard of the truck. Applying either while the truck is running will achieve the desired result of holding the truck stationary.
- the importance of rigorous application of risk and change management processes. The mine has no record of either a risk assessment or change management being applied to the installation of the starter motor test circuit to the equipment fleet. In this case, the identified risk control, fitment of the timer relay, was eventually demonstrated to be ineffective, while the importance of other risk controls implemented by the truck manufacturer did not appear to be given sufficient consideration when the decision was made to bypass them.

- the importance of using appropriate investigative techniques to avoid attributing an incident to a single causal factor, if an investigation is to achieve its intended outcome of preventing future recurrence of an incident.

About this information release

The Department of Industry as the WHS regulator for mining has issued this information to draw attention to the occurrence of a serious incident in the mining industry. The investigation may be ongoing. Further information may be published as it becomes available.

The information contained in this publication is based on knowledge and understanding at the time of writing. However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Department of Industry, Division of Resources & Energy, Mine Safety or the user's independent adviser.

For information about health and safety regulation on mine sites contact a mines inspector at one of our local offices: www.resourcesandenergy.nsw.gov.au/miners-and-explorers/safety-and-health/mine-safety-offices

Issued by

Gary Parker

Chief Inspector of Mines
Appointed pursuant to Work Health & Safety (Mines) Act 2013