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Potentially dangerous mechanical components on opal mine materials handling hoists

This safety alert provides information on a serious incident and safety advice for the NSW mining industry.

Incident

On 4 November 2016, a heavy steel material handling hoist bucket fell down an opal mine shaft, hitting a worker at the bottom of the shaft. The worker suffered fatal injuries.

Further details about the incident can be found at the Resources Regulator [website](#).

The hoist equipment

The material handling hoist used at the opal mine was an Agfab Super Hoist.

It was manufactured by Agfab Pty Ltd, a Queensland company that went into liquidation in 2009.

The hoist system consisted of a steel headframe, electric motor, hydraulic system, electrical control system including limit switches, steel guide rails, a winch drum, steel wire winch rope and a steel bucket. The bucket was 72 cm wide, 1.7 metres in height and the measured weight was 133 kg empty.

A critical component of the hoist's hydraulic circuit was the counterbalance valve. During the descent cycle this valve controlled the flow of oil to the winch drum motors resulting in a controlled descent of the bucket.

A single acting counterbalance valve (as installed on this particular material handling hoist) controlled oil flow in one direction only.

The investigation

The investigation has identified a potential safety issue with the hydraulic system, in particular the single acting counter balance valve. This issue may extend to other Agfab Super Hoists as well as other hoists with a similar design.

The present design of the hoist's hydraulic system, with only a single acting counter balance valve, creates a hazard to operators in the event of a winch cable over-spool scenario.

Counterbalance valves may also malfunction due to ingress of dirt/debris and or performance may degrade over time due to wear and tear. This could result in a valve failing to provide resistance to the oil flow, consequently failing to prevent the freewheeling of the winch drum.

An over spool scenario can be managed through the use of an overwind limit switch. An overwind limit switch did not form part of the Agfab Super Hoist design.

Compliance activities

The Resources Regulator will:

- produce a training course on the safe operation and maintenance of material handling hoists. Training will be held in Lightning Ridge and White Cliffs. Dates will be announced shortly.
- conduct regular Mine Safety Awareness and Mine Operator courses for opal mine operators and claim holders at regular intervals throughout the year.
- conduct regular inspections of opal mines and the use of materials handling hoists.

Recommendations

Opal mine operators should:

- have a competent person assess that their material handling hoist is functioning correctly and to ensure the bucket cannot freefall in an uncontrolled manner. If an uncontrolled free fall situation is possible, then suitable modifications are to be made to prevent this situation arising.
- If the hoist being used is an Agfab Super Hoist design, have a competent person assess the winch drive system for the suitability of retro-fitting a dual acting counter balance valve to the hydraulic system. A dual acting counter balance valve should prevent the bucket being able to freefall independent of winch drum direction.
- secure all material hoist buckets if work is to be undertaken in a shaft. The bucket should be secured, either at the bottom of the shaft or at the surface, with the hoist system isolated and protective guarding installed to prevent the bucket or other items from falling down the shaft.
- ensure that the mine's safety management system sets out the systems, procedures, plans and other control measures that will be used to control risks associated with material handling hoists at the mine.
- Never ride in or on a material handling hoist. The safety of people working in and around shafts and shaft hoisting operations is paramount. People must only ride on purpose-built hoists designed to carry people, and that are registered and comply with MDG 42.1.

Mine operators should review:

- NSW Opal Mining Safety Guidelines (4th Edition 2010), available at the Lightning Ridge Mine Safety Office
- Clause 49(5) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (NSW) - Control of shaft conveyances falling down shafts
- MDG 42.1 Person-riding hoists (winding systems) in small gemstone mines (Design) 2015.
- MDG 42.2, Person-riding hoists in gem mines (Maintenance) 2011.

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Disclaimer

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 information on which they rely is up to date and to check the currency of the information with the appropriate officer of NSW Department of Planning and Environment or the user's independent advisor.

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