



Significant Incident Report No. 272

Subject: Sinkhole in open pit floor engulfs mine vehicles after collapse of backfilled stope

Date: 11 January 2019

Summary of incident

Note: The Department of Mines, Industry Regulation and Safety's investigation is ongoing. Information contained in the significant incident report is based on findings at the time of writing.

In October 2018, a working pit floor subsided into a backfilled stope, forming a 13 metre deep sinkhole. The stope had previously self-mined to near surface and had been backfilled in stages since 2016. At the time of the incident, surface drill and blast activities were occurring in the vicinity. The subsidence event resulted in the loss of an integrated tool carrier and an explosives truck that were parked on the blast pattern. A number of charged blast holes were also engulfed in the sinkhole.

The vehicles were unoccupied at the time of collapse; however, four persons were working in close proximity.



Open sinkhole with mine vehicles

Direct causes

- At the time of subsidence, the backfilled underground workings were not treated as a void allowing work to be undertaken above an area of unknown stability.

Contributory causes

- A risk assessment in December 2017 identified the stope void as a hazard; however, recommended controls were not adhered to.
- The decision was made in July 2018 to move from strict void management protocols to standard mining practices on the (incorrect) assumption that the pre-2018 backfilled section of the stope void was tight-filled.
- Inadequate change management associated with the decision to move to normal operational practices.
- The exact cause of subsidence was undetermined due to lack of access, records and uncertainty about the void shape and fill material.

Actions required

The following actions are recommended to manage mining above underground workings.

Design

- Risk assess conditions within backfilled stopes and factor the potential for change over time.
- Conduct rigorous assessment of all failure mechanisms for voids and filled underground stopes as part of the pit design process (i.e. pillar collapse in the vertical or horizontal direction, backfill collapse).
- Ensure backfill records are available and include volume calculations, material characteristics and behaviour.

Operational

- Ensure all underground workings relevant to the proximity of active open pit work areas are marked on all working plans and void management processes are in place and applied.
- Adopt rigorous change management processes in critical decisions regarding operational practices, especially around voids (e.g. conduct rigorous site investigations to support any change in management strategies).
- Develop safe working practices that do not presume that any stope is tight-filled.

Monitoring

- Monitor and record any change in underground conditions below open cut workings, and take further action as/when appropriate.

Further information

- Mines Safety and Inspection Regulations 1995 r. 13.8 (3) Geotechnical Considerations
www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1819_homepage.html
- *Open Pit Mining through Underground Workings – guideline*

www.dmp.wa.gov.au/Documents/Safety/MSH_G_OpenPitMiningThroughUGWorkings.pdf

- *Geotechnical Considerations in Open Pit Mines – guideline*

www.dmp.wa.gov.au/Documents/Safety/MSH_G_GeotechnicalConsiderationsOpenPitMines.pdf

- *Monthly safety and health snapshot – Machinery falling into voids (November 2018)*

www.dmp.wa.gov.au/Documents/Safety/MSH_MSS_Nov18.pdf

- *Significant Incident Report No. 71 Sudden collapse of ground – sinkhole formation*

www.dmp.wa.gov.au/Documents/Safety/MSH_SIR_071.pdf

- *Safety Bulletin No. 62 Hazards of collapsing ground in mining operations*

www.dmp.wa.gov.au/Documents/Safety/MSH_SB_062.pdf

This Significant Incident Report was approved for release by the State Mining Engineer on 11 January 2019