Mines Safety Bulletin No. 178

Subject: Working on open pit walls using rope access systems

Date: 10 August 2020

Background

In Western Australia, personnel, including contractors, have been engaged to perform work associated with open pit wall stabilisation, wall control and geotechnical hazard remediation. Work involves personnel and specialist equipment working on or near pit walls (interim or final), using mechanical and rope access systems.

Activities include manual scaling using scaling bars or airbags, removal of geotechnical hazards by blasting techniques, installation of ground support and rockfall protection systems, ramp protection and reinstatement, erosion control, geotechnical instrumentation, mesh drapes and netting.

Workers drilling pit wall using rope access

In March 2017, a fatal accident occurred at an open pit in Tasmania, involving four technicians working off ropes, manually scaling loose rocks from a pit wall in preparation for the construction of a catch fence. While they were standing on one of the berms, a large rockfall occurred directly above them, which struck one of the workers causing fatal injuries. The other three workers were able to abseil to the bench below.

In WA, four incidents involving near miss or injuries to persons working on walls have been reported since 2016. In all incidents, the consequences could have been far worse.

- In August 2016, six rope technicians were hand scaling a section of an open pit in readiness for meshing. A rock fell from above, striking one of the workers, resulting in injuries to his forehead, thigh and knee.
- In January 2018, two rope technicians were hydroscaling a section of a pit wall. The technicians stopped their task and began ascending the wall for a break when around 75 tonnes of rock fell from the wall. Two large rocks (approximately 2m x 2m x 1m) landed on the berm about 10 metres from where the technicians had been working.
- In November 2019, a section of the pit wall was being scaled using air bags in preparation for ground support. During the wall scaling, around 5000 tonnes of material was mobilised from the wall. Some material fell close to a crane that was operating on the pit floor near the designated exclusion zone.
- In January 2020, a rope technician was struck on the foot by a rock while scaling a pit wall with a scaling bar.

Summary of hazard

Hazards associated with working on walls include:

- wall failure above and below workers
- falling rocks
- falling from heights
- unknown condition of rock mass
- failure of rope or lifting equipment
- dropped objects
- incorrect use of equipment
- rotating parts (drilling rigs)
- manual handling
- exposure to heat, dust, and noise
- delays in emergency response/recovery.

Contributory factors

- Inadequate mine designs with poor control of excavation.
- Inadequate scaling standards and practices as part of the normal mining cycle.
- Inadequate ground support standards and practices as part of the normal mining cycle.
- Deterioration of the rock mass over time.
- Inadequate surface and groundwater management.
- Ineffective pit wall monitoring and interpretation of data.
- Working in close proximity to the pit wall.
- Workers in the line of fire of falling rocks either directly (part of the work team) or indirectly (ancillary activities).

- Inadequate geotechnical information and analysis, during planning and on an ongoing basis, to determine the hazards associated with the work being performed.
- Inadequate risk assessment and planning of proposed remedial works, including selection of proposed methodology and consideration of alternative options.
- Lack of, or inadequate, safe work procedures/work instructions.
- Inadequate training of rope technicians and other relevant personnel in geotechnical hazards and scaling.
- Ineffective determination of the size, location and extent of exclusion zones.
- Inadequate technical input and supervision of work teams at critical stages in the work plan and when changes occurred.
- Inadequate management of contractor work teams.
- Inadequate change management practices.

Actions required

Due to the high risk nature of working on walls, a rigorous and robust risk management approach must be implemented for all stages of the proposed work. Manual scaling with rope access on steep slopes should not be used *unless* it is absolutely necessary and other alternatives are impracticable. The following actions are recommended to manage risks associated with working on pit walls.

Mine design and excavation

- Ensure rigorous and robust mine designs are implemented, based on sound geotechnical considerations (e.g. berm/batter configuration), to negate the need for working on walls.
- Implement quality control practices to ensure the as built excavation meets design standards.
- So far as is practicable, mines should install ground support and surface protection as part of the mining cycle and use remote methods for scaling the walls (e.g. hydroscaling, chaining and excavator raking the walls) in preference to hand scaling.

Method selection

- Establish a defined and documented process and standards for determination and selection of the appropriate work method and strategy for working on walls.
- The decision to place personnel on/near pit walls must be made by appropriate levels of management and be accompanied by rigorous risk assessment, geotechnical assessment and consideration of alternative methods.

Risk assessment and pre-task planning

- Conduct a risk assessment for all work on or adjacent to pit walls involving key stakeholders and considering various activities including maintenance and break-down scenarios.
- Conduct a geotechnical assessment of the proposed methodology as part of the risk assessment process including global stability, local rock fall hazards, relevant modelling techniques and using appropriate sources of information. Geotechnical reviews and input should be conducted on a regular and ongoing basis.
- Develop detailed work procedures and instructions for proposed remedial work based on the risk assessment. Adopt sound principals such as: good ground to bad ground, supported to unsupported ground, top down method, avoid positioning workers in the line of fire.
- Implement a rigorous employee and contractor selection process considering expertise, experience, competence, systems and safety culture.

- Determine and provide an appropriate emergency response plan, involving communication between site emergency personnel and rope technicians.

Environment and equipment

- Ensure selection of fit-for-purpose equipment based on the risk assessment and required outcomes.
- Provide reliable and effective communications between rope technicians and other personnel.
- Implement appropriate monitoring equipment, systems and associated TARPS, e.g. drones, cameras, real time monitoring systems (prisms, radar, laser).
- Use an effective design methodology to determine the size and shape of exclusion zones and hard barriers.

Training and supervision

- Establish an effective training and competency assessment process for operators and supervisors, including rope access techniques, scaling methods, and ground awareness.
- Ensure roles and responsibilities are designated and understood (e.g. technical, work crew, supervisory, contractor management).
- Ensure adequate supervision and monitoring of work tasks and inspection of workplaces including geotechnical input.
- Implement a robust change management process when changes occur.

Further information

Department of Mines, Industry Regulation and Safety

- Ground control for Western Australian mining operations – Code of Practice
  www.dmp.wa.gov.au/Documents/Safety/MSH_CoP_GroundControl.pdf
- Ground control management in Western Australian mining operations – Guideline
  www.dmp.wa.gov.au/Documents/Safety/MSH_GL_GroundControl.pdf
- Mines Safety Bulletin No. 69 Slope stability in open cut operations
  www.dmp.wa.gov.au/Documents/Safety/MSH_SB_069.pdf
- Mines Safety Bulletin No. 171. Pit wall failure management
  www.dmp.wa.gov.au/Documents/Safety/MSH_SB_171.pdf

AS/NZS 1891.1-4 Industrial fall arrest systems and devices

AS/NZS 4488.1-2 Industrial rope access systems

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