TARP – Subsidence

SCOPE

This TARP is a minimum standard for the safe operation of underground mining activities at Cowal. The subsidence TARP is designed based on the impact of stoping activities on likelihood of failures occurring based on data collected at Cowal underground and aims to mitigate the potential for a stope failure causing injury, equipment damage or fatality as a result of this.

BACKGROUND

The development of the subsidence TARP is designed to assist the Underground Mining Operations team in making informed decisions around risk management of the underground mine. The subsidence TARP includes monitoring triggers, action to escalate to ensure safety of personnel and response plan.

REPORTING REQUIREMENTS

The reason for closure, or partial closure, of the underground is to be documented and in the event of a rockfall occurring, or another geotechnical hazard being identified, an investigation is to be completed and CGO incident reporting systems are to be followed.

RELATED DOCUMENTS

- Subsidence risk assessment
- Subsidence principal hazard management plan
- Subsidence management plan

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SUBSIDENCE	LEVEL 1	LEVEL 2 (Moderate Risk)	LEVEL 3 (High Risk)	LEVEL 4 (Critical to Material Risk)
Subsidence Monitoring Movement Triggers	• **Movement less than 1mm in a day.** • **<2mm over the week.**	• **Consistent movement of between 1mm – 2mm per hour over 3 hours.** • **Consistent movement over a week between 2mm – 5mm.**	• **Consistent movement of between 2mm – 5mm per hour over 3 hours.** • **Consistent movement over a week between 5mm and 10mm.**	• **Consistent movement >5mm per hour.** • **Consistent movement >10mm in week at depths.**
Action to Escalate & Response Plan	• No action • Continue normal operations	• Stoping to continue • Geotechnical Department to investigate cause • Increase inspection frequency • Increase data review frequency • Alert Underground Mine Manager and Integrated Planning Manager • Inform workforce via prestart presentations	• Stop all stoping activities in sensor area • Barricade hazard area • Geotechnical Department to initiate investigation into cause • Increase inspection frequency • Increase data review frequency • Underground Mine Manager to elevate to SLT • Inform workforce via prestart presentations	• Stop all stoping activities • Barricade hazard area • Inform workforce via prestart presentations • Review extraction and long-term plans to reduce exposure • Underground Mine Manager to elevate to SLT • Implement plan to mitigate risk of subsidence event
Loss of Subsidence Monitoring Triggers	• **All instruments are functioning.**	• **Loss of communication to one (1) instrument.**	• **Loss of communication to three (3) or more instruments in one drive.**	• **Loss of communication to all instruments.**
Action to Escalate & Response Plan	• No action • Continue normal operations	• Stoping to continue • Geotechnical Department to investigate cause of loss and ensure redundancy. • Repair as soon as practicablepractical (depending on situation	• Bogging and stope firing in sensor area to cease. • Geotechnical Department to initiate investigation into cause of loss • Action plan to repair or replace (depending on situation)	• Bogging and stope firing above 1020RL to cease. • Geotechnical Department to initiate investigation into cause of loss • Action plan to repair or replace (depending on situation)

***TARP trigger levels are based on guidance from sites with similar monitoring and rock mass strain capacity and will be refined once baseline of production rock mass response is established**

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Development Strata Failure Triggers	• **Drives are stable.**	• **Wedge falling from backs in unsupported ground during supporting cycle (bogging, scaling, installing support).**	• **Unravelling backs in unsupported ground during development cycle up to 1m beyond height of drive (bogging, scaling, installing support).**	• **Any failure in supported ground or unravelling beyond 1m in unsupported ground.**
Action to Escalate & Response Plan	• No action • Continue normal operations	• Notify Shift Supervisor • Immediately support to specified ground support standard (GSS) • Report to Geotechnical Department • Continue development activities	• Notify Shift Supervisor • Cease all development activity in drive • Fibrecrete as soon as possible (immediately) • Notify Underground Mine Manager • Notify Geotechnical Department	• Notify Shift Supervisor • Cease all development activity in drive area and barricade • Commence preparations for fibrecrete installation on authorization of the Underground Mine Manager • Notify Underground Mine Manager • Notify Geotechnical Department • Freeze scene after stabilization of the scene
Stope Strata Failure Triggers - Crown of Stopes between 1050 and 1020	• **Stope is stable.**	• **Rockfall causing HW or FW to be undercut by <1m with potential impact at base of crown pillar on 1050 level).**	• **Rockfall causing HW or FW to be undercut by >1m or < 3m with potential impact at base of crown pillar or rocks within the stope >1m3.**	• **Rockfall impacting 1050 level or rockfall causing HW or FW to be undercut by >3m with potential impact at base of crown pillar or rocks within the stope >2m3.**
Action to Escalate & Response Plan	• No action • Continue normal operations	• Notify Shift Supervisor • Report to Geotechnical Department • Inform workforce via prestart presentations to increase awareness • Continue to inspect to ensure no escalation to level 3 • Continue normal activities	• Notify Shift Supervisor • Bogging and stope firing in stope to cease (other activities such as drilling may continue). • Arrange for Survey scan and review frequency of scans required • Notify Geotechnical Department • Inform workforce via prestart presentations to increase awareness • Continue to review each day to ensure no escalation to level 4 • Prioritize stope cycle to ensure completed in minimum time	• Notify Shift Supervisor • Cease all work and stope firing activities in stope to cease. • Arrange for Survey scan and review frequency of scans required • Notify Geotechnical Department • Commence preparations for filling on authorization of the Underground Mine Manager •

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