Remediation of collapsed steel portal tunnel at Yaramoko Mine

Colin Thomson[1], *John Player*[2], *Richard Moyle*[3] *and Adama Baro*[4]

1.Senior Geotechnical Engineer, MineGeoTech, Perth WA 6000. Email: colinthomson@minegeotech.com.au
2.Principal Geotechnical Engineer, MineGeoTech, Perth WA 6000. Email: johnplayer@minegeotech.com.au
3. Principal Geotechnical Engineer, GGC, West Leederville WA 6007. Email: richard.moyle@ggconsultants.com.au
4.Rock Mechanics Engineer, Roxgold SANU, Ouagadougou Burkina Faso. Email: abaro@roxgold.com

Keywords: Remediation, rehabilitation, corrugated steel tunnel, portal collapse

ABSTRACT

The buried corrugated steel tunnel in the boxcut to the portal of the Z55 underground mine at the Yaramoko project in Burkina Faso collapsed in April 2023 leading to a pause of operations. The direct cause of the failure was not determined but several bolts pinning two sheets of the corrugated steel to each other were sheared through without any signs of corrosion, which allowed a significant amount of backfill material to force its way between the sheets, damaging the tunnel and blocking the decline. In order to repair the failure, the backfill material around the steel tunnel was partially excavated to expose the failure area but due to the short mine life it was decided not to fully replace the steel tunnel, thereby leaving an open gap where the damaged panels were removed. Leaving a section of the boxcut exposed required a geotechnical assessment and a plan for remediation works of the backfill material around the still partially buried steel tunnel. Fibrecrete was used to support the edges of the open portion of the steel tunnel while gabion walls were constructed to buttress the fill material either side of the upper portion of steel tunnel. Geofrabric and clean waste waste rock were then placed over the backfill material to control the flow of water into the open box cut. Open sumps were built either side the lower section of steel tunnel to manage rainfall during wet season and prisms installed around the box cut to monitor deformation of the backfill material and exposed box cut walls. So far, minimal deformation has been recorded and these remedial works have allowed normal operations to continue at the mine unimpeded.