

The implementation of de-stress gold mining technique along complex geological structures and heavily fractured ground conditions

F. Sengani; T. Zvarivadza;

Abstract

De-stress mining is one of the techniques used in mechanized, semi mechanized and conventional deep to ultra-deep gold mines in South Africa. This mechanism involves the use of face-perpendicular preconditioning practice that transfers induced stress far ahead from the mining faces. This paper aims to highlight the effectiveness of face perpendicular preconditioning practice when mining heavily fractured ground. The trial was conducted in two sections of a deep level gold mine where the mining faces intersected the major faults. The ground conditions in the vicinity of the faults were heavily fractured, the previous geotechnical strategic designs made in order to mine the areas were not successful, leading to some of the ore being left unmined. Eventually, face perpendicular preconditioning practice was developed for such special areas. The developed face-perpendicular practice involved the use of five 4 m long drilled and blasted face-perpendicular preconditioning holes coupled with an increase in support density and with the use of 1.5 m long production holes. During the trial; no face burst/pillar bursting were reported, ground conditions on the hangingwall, sidewall and face were found to improve. A borehole camera was used to validate fracture frequency ahead of the mining faces while a Ground Penetrating Radar (GPR) was used to generate depth of fracturing ahead of the mining faces. Numerical modeling and microseismicity monitoring were also used to verify the results.