Stability of underground mine development intersections during the life of a mine plan

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Abstract:

The stability of mine developments is of utmost importance during the planned period of production or the life of a mine plan. Many Canadian underground mines use transverse stoping with delayed backfill to extract tabular ore deposits. These methods require access to the orebody through a number of sill drives and cross cuts which link the orezone to the haulage drift hence creating intersections on multiple levels. This paper presents the results of a study on the stability of mine development intersections at Garson Mine of Vale in Sudbury, ON, Canada. Multi-point borehole extensometers (MPBX) are used to monitor the rock deformations of an intersection as mining activities progress. The monitoring results are used to calibrate a multi-level FLAC3D numerical model, which has been developed to assess the stability of the intersection. It is shown that stope extraction causes a lateral shift to the intersection, accompanied by high shear stress in the roof. It is also shown that same-level mining has stronger influence on the stability of the intersection than lower-level mining.

Keywords:

Mine developments; underground mining; deformation monitoring; numerical modelling; rock failure, and Case study.

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