

PROJECT DESCRIPTION

Luossavaara-Kiirunavaara AB (LKAB)

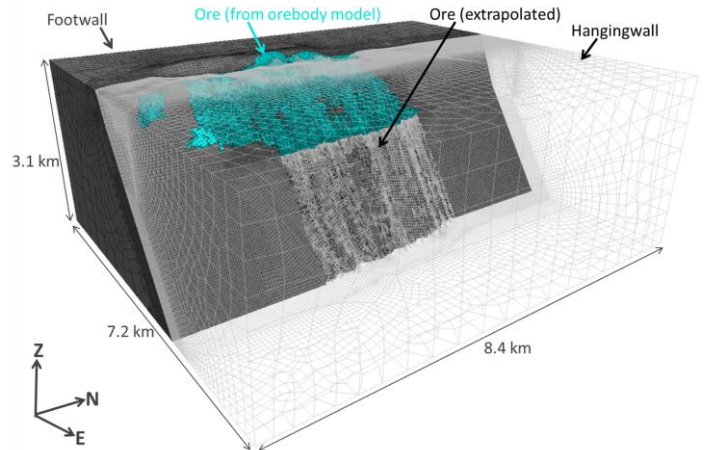
Kiirunavaara Mine, Sweden



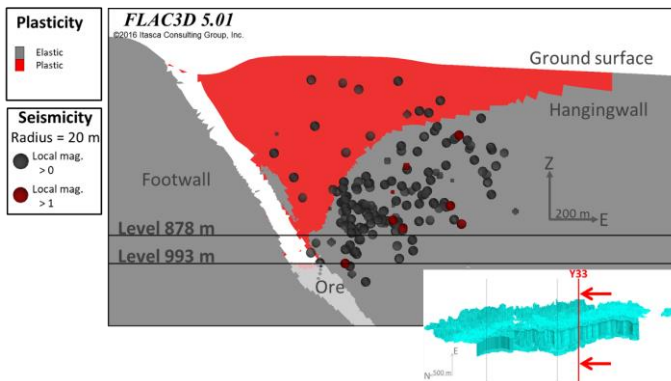
LKAB's Kiirunavaara Mine is a large, underground, sub-level caving mine that has been seismically active since approximately 2008. With this seismic activity comes associated vibrations. These vibrations can be felt on surface in the town of Kiruna, which is currently located close to the mine on the hangingwall side. The mine is undergoing a national permitting process concerning a desired increased production rate. An important question for this process is: will the increased production rate result in changes to vibrations in the town due to seismicity?

ITASCA'S ROLE

Itasca has helped LKAB by answering this question using state-of-the-art knowledge and techniques. First, we worked with LKAB to statistically understand seismicity and vibrations at the mine. Then, we built a 3-D numerical stress analysis model to conduct detailed analyses concerning historic seismicity so we could make judgements about the influence of the planned production on future seismicity. Indicators in the model of crack initiation and potential movement along pre-existing discontinuities were used as comparators to seismically active volumes which likely contributed to vibrations on surface.



PROJECT RESULTS



Results did not show any likely changes to vibrations and seismicity caused by the planned production, based on our current knowledge in the field of rock mechanics and of the mining environment. Seismically active volumes in the hangingwall, which correlated to the location of plastic failure in the models, are not expected to significantly change location in the future. Additionally, patterns in the orientations of discontinuities that can slip were consistent throughout past and planned production. For more information, see Vatcher *et al.* (2017).

REFERENCES

Vatcher, J., Sjöberg, J., Bošković, M. and Wettainen, T. (2017) 'Numerical modelling and seismicity at the Kiirunavaara Mine, Sweden', in *3rd Nordic Rock Mechanics Symposium Proceedings. NRMS 2017*, Helsinki, Finland: ISRM, pp. 185–195.