

## **Geological Modeling at the Fortaleza de Minas Nickel Massive Sulfide Open Pit Mine, Minas Gerais State, Brazil**

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The Fortaleza de Minas deposit is the first massive sulfide nickel mine to operate in Brazil. This polymetallic Ni-Cu-Co-PGM volcanogenic orebody was discovered in 1983 within komatiitic flows from the Archean Morro do Ferro greenstone belt. The orebody displays a sub-vertical tabular shape trending NW-SE along a major transcurrent shear zone. Its dimensions are 1700m long, 600m depth and 4.5m of average width.

The orebody shows evidences of a magmatic origin related to gravitational settling of sulfides in a differentiated ultramafic flow placed in an interpreted embayment structure. Lateral development of sulfidic banded iron formation outside the embayment structure shows similarities to the Kambalda deposits. The deposit has been affected by a succession of tectonic and metamorphic events, which promoted complex structural and mineralogical changes. The current lode structure and the different ore types reflect these transformations where a primary embayment domain and an alloctonous remobilized zone display contrasting ore types.

The ore will be mined by both open pit and underground operations; using highly selective mining methods. In the open pit mine the ore is currently being mined within 5m benches where systematic geological mapping of both ore and waste rocks provides a detailed 3D geological model. The model provides a sound basis for resource modelling and grade control. A strong structural control of the orebody was defined by pinch and swell structures and sigmoidal elongated lenses along a sheared anastomosed pattern.