

Mesothermal Gold Mineralization and Fluid Flow in Transpression at How Mine, Zimbabwe

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The How mine near Bulawayo in the Zimbabwe Archean craton is hosted in late Archean metasedimentary and metavolcanic rocks. Subvertical bedding (S0) trends Northwest and the regional cleavage (S1) is generally at low angles to bedding, with a consistently dextral vergence, outside the mine area. The mine forms a distinct structural domain with similar proportions of dextral and sinistral cleavage vergence, and high S0/S1 angles. The cleavage vergence demonstrates a localised zone of asymmetric, dextrally verging folds that have strong subvertical stretching lineations. Ore bodies are zones of intense alteration dipping steeply to the west with sub-vertical lineations, and a reverse shear. The mine is adjacent to the regional, dextral Gabalozzi fault zone. Dextral shear, folding, cleavage, subvertical stretching and reverse shear were part of one progressive deformation event during which mineralization occurred at greenschist facies. Fluid flow and mineralization occurred along steeply dipping reverse shear zones in the subvertical extension direction. The steep dip of the shear zones required high fluid pressure for reactivation. High S0/S1 angles may have contributed to permeability along S1/S0 intersections in the mine domain. The combination of subvertical extension and strike slip movement is characteristic of transpression, which has not generally been considered as a mineralizing kinematic regime. However, the high pore fluid pressures necessary for reactivating structures in transpression may be inherently favourable for mesothermal mineralization.