# Controls of Sulfide Mineralization at the Kamoa Copper Deposit, with an Emphasis on Structural Controls, SE Democratic Republic of Congo

Franck Twite,[1,2*] David Broughton,[2] Paul Nex,[1] Judith Kinnaird,[1] and David Edwards[2]

[1]School of Geosciences, University of the Witwatersrand, Private Bag 3, WITS 2050, Johannesburg, South Africa
[2] Ivanhoe Mines Ltd., 82 Maude St., Sandton 2146, South Africa

*E-mail, franktwite@gmail.com

The Kamoa copper deposit, situated approximately 25 km west of the Kolwezi Cu-Co district of the Democratic Republic of Congo, is one of the largest high-grade undeveloped copper deposits in the world. Kamoa is a new discovery which occurs on the western edge of the Congolese portion of the Central African Copperbelt. Two main rock units are present at Kamoa—sandstone and conglomerate of the Mwashya Subgroup of the Roan Group, and overlying diamictite and interbedded siltstone-sandstone of the Grand Conglomerate unit of the Nguba Group. The deposit occurs along a stratigraphically controlled redox boundary at the base of the Grand Conglomerate. The Kamoa deposit occurs broadly within a NNE-trending structural high bound to the west by the West Scarp fault and to the east by the Kansoko trend. Within this area the host rocks dip gently away from two localized domes, which expose rocks of the Mwashya Subgroup.

Drill core data indicate that the Kamoa deposit includes areas of higher and lower grade, some of which appear at the deposit scale to be related to known or interpreted faults. This study aims to determine the role of structure(s) in the genesis and distribution of hypogene copper sulfides, and to identify the nature of those structures and their timing relative to mineralization. Detailed structural logging in drill core has focused on analysis of foliations, folds, micro-faults, symmetric and asymmetric strain-shadow and strain-fringe sulfide, and gangue mineral growth around clasts. Isopach and structure contour maps are used to investigate spatial relationships of mineralization with facies/thickness changes and faults throughout the deposit.

Within the Kamoa deposit, the orientation of the $S_1$ foliation is similar to that observed in strain shadows/fringes and varies between areas: in the south, the foliation dips to the SSE whereas in the north, it dips to the NNW. Most of the microfaults recorded in drill core from the Kamoa project area show normal movement and appear to postdate or be synchronous with sulfide mineralization. Asymmetric $F_1$ folds observed in Kamoa drill core are rare structural features and represent synsedimentary slump folds of non-tectonic origin that appear to predate the steep $S_1$ foliation and sulfide mineralization.

In the southern part of the Kamoa deposit, a linear NNW zone of abrupt change in stratal thickness is oblique to the localized domes and correlates well with higher copper grades. Intervals of high-grade copper contain steeply dipping bedding, soft sediment deformation, slumping textures, and synsedimentary microfaults. These features suggest the presence of a growth fault during deposition of the basal Grand Conglomerate. Understanding the nature of the zone showing the abrupt change of thickness associated with high grade copper mineralization can aid in the development of future exploration techniques.