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Exploring Geological Complexities of the Kakula Cu Deposit, Democratic Republic of Congo

Franck B. Twite[1], George Gilchrist[2]
1. Kamoa Copper SA, Kolwezi, Democratic Republic of the Congo (Kinshasa), 2. KoBold Metals, Berkeley, CA, USA

The Kakula Cu deposit, situated west of the Kolwezi Cu-Co district in the Democratic Republic of Congo, is a rift basin that hosts exceptionally high copper grades. Kakula is understood to be a redox-controlled sedimentary rock-hosted stratiform copper deposit that developed at a redox boundary between the Mwashya Subgroup and the overlying Grand Conglomérat. Following the discovery of the Kakula deposit in 2016, resource drilling indicated that the deposit includes well-defined higher- and lower-grade zones that trend in a WNW orientation. The resource drilling identified areas of steeper dip, but was not tight enough to model smaller-scale features. Mine development (at February 2024) includes approximately 130 kilometers of linear development that has allowed detailed morphology and grade trends to emerge. Detailed underground geological mapping on 5-meter spacing was conducted to better understand structures and their impact on the Kakula mine design. Syn-sedimentary faults formed during the deposition of the Grand Conglomérat were recognized by steeply dipping bedding, soft-sediment deformation, and thickness variation in siltstones towards the base of the Grand Conglomérat. These structures, which create an offset varying between 5 and 40 m, occur over short distances of <25 m, impacting the mining production. Asymmetric folds possibly linked to basin inversion were identified in the Kakula area; they have a wavelength of 30 to 60 m and create an uplift of 4 to 12 meters. Understanding these structures and how to predict them is crucial for effective resource management and mine planning, but the short distance over which they develop precludes them from being properly characterized by surface drilling alone. The presentation will provide a comprehensive overview of the Kakula deposit, focusing on its basin architecture and controls on mineralization.