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Beyond Kamoa and Kakula: Exploration in the Western Foreland

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The Western Forelands (WF) area of the Democratic Republic of Congo is host to the Kamoa-Kakula complex, which contain 37.91 Mt of Cu at an average grade of 2.72% (measured and indicated). After the discovery of this world-class complex in the 2000s, the WF has been the focus of extensive exploration. The discovery of the Makoko Deposit (2017), the Kiala Deposit (2018), and more recently, high-grade mineralisation at Kitoko at over 1,000-m depth, demonstrates the continued prospectivity of the region.

The mineralisation model has continued to evolve and benefit from the sustained exploration effort. One key feature of the mineralisation model is the pre-sedimentary basement architecture which informs the deposition of sediment facies. The understanding of basement architecture is ongoing and geophysical tools are being trialled to improve pre-drilling models. Mineralisation discovered in the western portion of the shelf is located where pyritic units, generally siltstones, are forming at onlap positions close to basement. These pyritic units supply the sulphur required to generate Cu sulphides, acting as the reductant.

At Kamoa-Kakula, a thick sequence of Roan underlies the deposits and was thought to be essential to generate high-grade mineralisation. Recent high-grade mineralisation in Nguba sediments directly overlaying basement has shown that a proximal "red-bed" aquifer is not needed. Lack of an aquifer necessitates a different mechanism for introducing mineralising fluids to the host lithologies. Two working hypotheses are that fluids could be introduced by regionally significant faults joining the WF to the greater copper belt, or alternatively that fracture networks in the basement have allowed ingress of fluids. Another area where the mineralisation model is evolving is the alteration assemblages that are forming associated with ore. These alteration packages are forming distinct haloes where grades are low, but at the edge of a large mineralising fluid system.