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The Antelope Deposit, Otjikoto, Namibia: An Integrated Geochemical and Mineralogical Study

Charlie B. Hamblet
Camborne School of Mines - University of Exeter, Penryn, United Kingdom

The Otjikoto Gold mine stands as the largest gold producer in Namibia. In 2022, approximately 3km south of the Otjikoto pit, the new “Antelope Deposit” was identified following drilling of targets generated from magnetic inversion data. Subsequent definition by 100m x 50m spaced drilling identified up to three separate ore shoots, with mineralisation of each shoot remaining open to the northeast and southwest. Mineralisation is predominantly vein hosted within amphibolite facies metasediments of the Northern Damara Belt, and displays a complex relationship between lithology, mineralisation, and structural deformation.

This MSc thesis employs a range of new qualitative and quantitative data derived from whole-rock geochemical analysis, ICP-MS, EPMA, and a collection of polished thin sections to develop a comprehensive overview of the genesis at the Antelope Deposit. A total of 7 drill holes have been studied across Antelope, as well as holes from Otjikoto and Wolfshag for comparison.

The integration of whole-rock geochemistry and targeted ICP-MS aims to characterise alteration composition, distribution and intensity, with a focus on its implications on Au grade and potential post-mineralisation remobilisation. Insights into alteration history and relative timing will be investigated through an EPMA study targeted at zoning growth patterns of hydrothermal garnets in mineralised zones. Growth geometry and geochemical fluctuations across garnet zones will be used as a proxy to discern fluid composition and conditions throughout mineralised periods. In addition, a detailed petrographic study aims to construct a paragenetic sequence of the mineralised zone, drawing comparisons between Antelope, Otjikoto and Wolfshag mineralisation styles.

No such dedicated study has focused on the complete characterisation of alteration and mineralisation across Antelope. This research will contribute to the mineralogical and geochemical understanding of the deposit and its genesis, as well as identifying potential vectors for further exploration on a local and regional scale.