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Sulphide Mineralization and Associated Platinum Group Elements in Mafic-Ultramafic Units of the Tantalite Valley Complex, Southern Namibia

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Magmatic sulphide deposits are an important source of base-, semi-, and precious metals such as platinum group elements (PGEs), nickel, copper, and cobalt. These elements are crucial in facilitating the green energy transition, and finding more of these deposits is to be considered of critical importance. The study investigates the Tantalite Valley Complex in southern Namibia and evaluates the mineralization potential of this complex and by extension the Kum Kum Suite. This complex is geologically located within the Pofadder Shear Zone in the Richtersveld Subprovince in the Namaqua sector of the Namaqua Natal Metamorphic Province.

Research to date has determined that sulphur within the complex is derived from the mantle, characterized the sulphide assemblages and their trace element makeup, and determined an R-factor of roughly 3,000, suggestive of moderate degrees of sulfide/silicate melt interaction. With the present data set, it is speculated that sulphide immiscibility was brought about due to high degrees of crystal fractionation, with sulphide melt preferentially concentrating within an orthopyroxenite layer in the southeastern sector of the complex. This study reports for the first time the occurrence of PGEs and platinum group minerals within the sulphide assemblages belonging to the Tantalite Valley Complex, highlighting the prospectivity of the region for this deposit type and the need for further research and exploration in a relatively underexplored mafic magmatic suite.