

Paper Number: 52

Zn spinel composition in the Mavala-Mpaca area, southern Xixano Complex, Northern Mozambique

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The regional geology of northern Mozambique and the Xixano Complex has been addressed in numerous publications, most recently by Boyd et al. [1].

Rovuma Resources Limitada undertook extensive soil sampling and analysis (Niton XRF) in the Mpaca and Mavala Area, in the southern parts of the Xixano Complex. Geostatistical processing and interpretation of the data resulted in well-defined anomalies, mainly associated with high Zn values. High priority anomalies were subsequently drilled by Rovuma Resources Limitada.

Rovuma geologists provided carefully selected core samples, of varying composition and containing spinel for detailed mineralogical and mineral chemical analysis. Gahnite and zincian spinel of restricted composition have been found to be associated with metamorphosed massive sulphide deposits,[2] and more recently, [3]. This investigation was undertaken to establish whether the spinel occurring in the rocks on the Rovuma prospects showed similar restricted composition.

This study found significant variation in gahnite compositions in individual boreholes from Mpaca and Mavala. The gahnite analysed are not particularly Zn-rich and do not plot close to the $ZnAl_2O_4$ apex of the spinel ternary plot. The Zn spinel mineral chemistry from Mpaca plot toward the Mg-spinel end-member composition, suggesting formation from sulphur poor rocks in Mg-Ca-Al alteration zones. The Zn spinels analysed from borehole core drilled in the Mavala area is enriched in the hercynite (Fe) component, plotting in the field suggesting Fe-Al-rich metasedimentary and metavolcanic rocks. Individual grab samples selected for their spinel mineralization have the most Zn-rich spinel compositions. There is significant variation in spinel composition between borehole samples.

From this initial investigation it can be concluded that the compositions of the spinels are affected by the bulk compositions of the host rocks, and it is recommended to take into account the bulk rock compositions and alteration when investigating gahnite compositions.

References:

[1] Boyd R. et. al. (2010). The Geology and Geochemistry of the East African Orogen in Northern Mozambique. S. Afr. J. Geol. 113.1: 87 -129

[2] Spry P.G. and Scott S.D. (1986). The stability, synthesis, origin and exploration significance of zincian spinel. *Econ. Geol.* 81: 1446-1463

[3] Heimann A. and Spry P.G. (2005). Zincian Spinel associated with Metamorphosed Proterozoic Base-Metal Sulphide occurrences, Colorado: A re-evaluation of Gahnite composition as a guide in exploration. *Can. Min.* 43: 601 – 622.

