

**GOLD-SULPHIDE MINERALISATION IN THE GIYANI GREENSTONE
BELT: CASE STUDIES AT BLACK MOUNTAIN AND WEST-59
TARGETS, LIMPOPO PROVINCE, SOUTH AFRICA**

By

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Abstract

Detailed geological mapping, rock and soil geochemistry, as well as petrographic studies were undertaken for the Black Mountain and West-59 prospects in the Giyani Greenstone Belt. Atomic absorption spectrometry (AAS) was used to analyse soil samples, X-Ray fluorescence spectrometry (XRF) was used for whole rock geochemical analysis, and inductively coupled plasma optical emission spectrometry (ICP-OES) for Au assays.

Mafic and ultramafic rock units at Black Mountain prospect indicated a calc-alkaline trend whilst, the total alkali and silica (TAS) classification of the ultramafic rock units at West-59 prospect resembled a picro-basaltic, basaltic to basaltic-andesite composition. These rock units were also subjected to silicification and sericitisation and exhibited greenschist to amphibolite facies mineral assemblage as reflected by their lepidoblastic and schistosity texture.

Black Mountain prospect indicated high content of Cu in mica schist of 403 ppm whilst, Ni was elevated in cummingtonite schist (2407 ppm) and Mn in BIF (4423 ppm). Maximum concentrations of Ni, Cu, and Mn of 1534 ppm, 217 ppm and 3485 ppm respectively were registered in soil at the prospect. Such trends were attributed to the weathering of mica schist, cummingtonite schist and BIF which are prevalent at the prospect. As and Zn content were higher in soil (334 ppm and 672 ppm respectively) than in rocks (18 ppm and 129 ppm respectively). West-59 prospect indicated As content of 389 ppm in cummingtonite schist whilst, soil indicated a much higher value of 516 ppm. The existence of anomalous trace metals in soils at the two prospects indicated a significant finding which could be related to primary ore mineralisation within the rocks in the area.

Highest Au contents of 89 ppb and 70 ppb were recorded in soils at Black Mountain and West-59 prospects respectively. The Au anomalism in soils, apparently, is indicative of Au mineralisation within the prospects. The moderate correlation coefficient between Au:Zn (0.66), Au:Cu (0.59), and Au:As (0.52) in soil at the Black Mountain prospect affirms the genetic relationship between Au and sulphide mineralisation in the study area. Since As, Zn and Cu are more readily detected and have a more homogenous distribution than Au, their geochemical signatures can be indicative of Au mineralisation in the study area. The study indicated that the Giyani greenstone belt has potential for Au mineralisation, consequently, further exploration over the outlined anomalous As, Zn and Cu concentrations by pitting, trenching and drilling is recommended.

Keywords: Giyani Greenstone Belt, gold mineralisation, anomalous trace metal