GRAVITY, MAGNETICS, RADIOMETRICS AND INDUCED POLARISATION TECHNIQUES FOR MINERAL EXPLORATION IN THE KUPA GRID, MADHLAMBUDZI, SOUTH WESTERN ZIMBABWE

by

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Dedicated to my Mother

ABSTRACT

The geophysical techniques of gravity, magnetics, induced polarisation (IP) and radiometrics were carried out in Madhlambudzi about 120 km west of Bulawayo from May to June, 2006. The area is overlaid by Kalahari sand and is suspected to conceal massive sulphide deposits which host precious and base metals.

The Kupa exploration grid consisted of 17 lines, ranging from 1,7 km to 2 km long, running north–south with one long line of approximately 3,8 km. The gravity survey was done using a 25 m station spacing on 5 lines. It revealed a steeply dipping, dense, NE – SW trending body with a density-thickness product of 3,09 x 10^5 kg/m^2 at a depth of 246 m.

The ground magnetic survey was done at a 12,5 m station spacing over 15 lines. This defined an ENE – WSW trending magnetic anomaly in the southern corner of the grid with weaker sub-parallel magnetic features to the north. This was found to be consistent with banded iron formations (BIF) at depths of 24 m and 90 m.

The radiometric survey was conducted on 6 lines with a station spacing of 25 m. It only managed to pick out the clay soils of the banks of the braided Chamata river system. However, it is suspected that a northern east–west trending anomaly could indicate a shallow buried granite, delineating the northern greenstone-granite contact as proposed by the local geology.

Three infill IP lines were done with a station spacing of 50 m. The data was combined with previously surveyed lines to reveal a bimodal occurrence of the anomalies along each line. The anomalies indicate both disseminated and massive sulphide signatures. It was found that the geophysical data is consistent with the massive volcanogenic sulphide (VMS) deposit model proposed by company geologists.

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