

The Application of Geophysics Over the Mount York Gold Deposit, Western Australia

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Abstract

A resource of about 1 Mt of gold at 2.7 g/t has been delineated at Mount York, 120 km south-southeast of Port Hedland in the Pilbara Region of Western Australia. The deposit is contained within a banded iron-formation.

In order to supplement ongoing geological investigations to define the resource, a geophysical programme was undertaken to assist mapping and also delineate primary sulphide zones which could have associated gold mineralisation. Aeromagnetic, spectral induced polarisation, surface and downhole electromagnetic surveys, and downhole density logging were undertaken.

The magnetic data clearly outlined the lateral extent of the banded iron-formation but were unable to delineate subtle structure which was thought to control primary mineralisation. Induced polarisation and electromagnetic surveying provided numerous targets in both the primary and oxidised zones. Drill testing of these primary-zone targets intersected sulphide mineralisation but, unfortunately, no gold mineralisation of economic width and grade. Downhole density logging of the secondary oxide zone allowed the density of the mineralisation to be better defined and hence provided a sound base for resource calculations.

Geophysical Investigations of the Kalgoorlie Goldfield, Western Australia

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Abstract

Leases held by Kalgoorlie Consolidated Gold Mines Pty Ltd over the Kalgoorlie Goldfield have an approximate area of 30 by 10 km, with the main production areas of Fimiston, Mount Charlotte and Mount Percy within the central portion of this tenement block. Due to the proximity of the leases to residential areas, significant portions of land are inaccessible for exploration. Near-surface contamination, as a result of historical mining and prospecting, also presents problems, as do the deep weathering profile and associated conductive overburden, which covers most of the Kalgoorlie Goldfield.

Due to the relatively small size of the lease holdings and the constraints detailed above, the currently employed geophysical techniques mainly involve detailed ground surveys and include petrophysical studies of the three principal styles of mineralisation and the surrounding host rocks. The aims of the surveys are improved definition of geological features, and indirect detection of the three principal styles of mineralisation recognised at Fimiston (Golden Mile), Mount Charlotte and Mount Percy.

The petrophysical data indicate that gravity, magnetics and induced polarisation can be used for the delineation of rock types whereas induced polarisation has potential to identify mineralisation. The combination of gravity and ground magnetic surveys at a prospect scale permits considerable refinement of the structural and lithological features in areas of poor outcrop. Studies are ongoing evaluating the potential use of downhole induced polarization for detection of Mount Charlotte-style stockwork mineralisation, and the use of ground penetrating radar to detect voids for underground mining.

Some Aspects of the Magnetic Signature of the Bottle Creek Gold Deposit, Western Australia

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Abstract

The Bottle Creek gold deposit lies on a north-trending structural break between two major terrains in the Ularring greenstone belt, north of Kalgoorlie. Aeromagnetic data in the vicinity of the deposit suggest several structures which appear to have controlled gold mineralisation. The mineralised horizon lies at a structurally discordant, north-northwest-trending internal junction within a thick mafic sequence in the eastern terrain. Lithological variations within this sequence have been inferred to represent distinct upper and lower groupings, and are structurally determined. Interpreted dips within the eastern terrain are very steep and can be contrasted with much shallower regional dips in the western terrain. Mineralisation within the Emu Formation host, which occupies a sheared zone, contains pyrrhotite but the observed magnetic responses along the structure appear to reflect magnetite-constructive alteration near the boundary. There are two shears; the largest separates western and eastern sequences, which meet acutely but are not mineralised along the shear. There is a lesser parallel structure further east. The structures are separated by a mafic unit which generates a chain of isolated magnetic responses along this structure. The Bottle Creek deposits are associated with sheared and altered junctions along the, apparently, lesser shear. Major deposits appear to be localised where this shear is intersected by large northeast-trending fractures.

Relationship Between Magnetic Anomalism and Epigenetic Gold Mineralisation in the Victory-Defiance Area, Western Australia

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Abstract

The relationship between gold mineralisation, genetically related mineral assemblages, magnetic susceptibility and features observable in ground and airborne magnetic surveying is established at three gold mines in the Victory-Defiance gold camp at Kambalda, Western Australia. The gold mines are Orion, North Orchin and Revenge. There are significant magnetite-stable alteration haloes enveloping the gold lodes comprising these deposits.