structures believed to have influenced gold deposition. Magnetic and gravity data delineated several features for which geological explanations remain speculative. The application of geophysics did not detect mineralisation, nor was it expected to, but has been a valuable tool in advancing our geological knowledge of the system.

Archaean BIF-Hosted Gold, Mount Morgans, Western Australia: A Geophysical Case History

Tony N. Fallon[1] & John Backo[2]
1. M.I.M. Exploration Pty Ltd, P.O. Box 1042, Brisbane, Qld 4001 (formerly Dominion Mining Ltd). 2. Dominion Mining Ltd, P.O. Box 41, Laverton, W.A. 6440.

Abstract

The Mount Morgans Archaean gold deposit is hosted by banded iron-formation and has produced over 25 t of gold to date. The gold is associated with sulphides which have replaced magnetite.

Aeromagnetic data covering the Mount Morgans deposit show a variably depleted magnetic effect caused by the replacement of magnetite by non-magnetic minerals, chiefly pyrite. Coincident with the magnetic effect is a conductive response recorded using airborne electromagnetics. The likely source of this conductivity anomaly is the weathering profile.

The main ground geophysical surveys over the deposit are magnetics and 50 m dipole-dipole induced polarisation. The induced polarisation detected a chargeability anomaly associated with the sulphide mineralisation and a conductive response associated with the weathering of sheared rocks. Surveys of magnetometric resistivity and very low-frequency electromagnetics have been conducted over the Mount Morgans North resource, a similar but smaller gold resource located on the BIF ridge north of the main Mount Morgans deposit. The responses observed over this resource confirm the conductive and chargeable nature of the sulphide mineralisation associated with the gold.

Bounty Gold Deposit, Western Australia: Magnetic and Electromagnetic Responses

John H. Coggon[1] & Robert A. Rutherford[2]
1. Mines Geophysical Services, 16 Victoria Street, Kalgoorlie, W.A. 6430. 2. Aztec Mining Company Ltd, P.O. Box 585, Victoria Park, W.A. 6100.

Abstract

Mineralisation at the Bounty gold deposit is in a steeply plunging zone within a sheared iron-formation in the Archaean Forrestania greenstone belt. The gold was deposited together with pyrrhotite, replacing magnetite, but later dyke intrusion has converted pyrrhotite to magnetite adjacent to the dyke. Geophysical surveys have included magnetic and transient electromagnetic measurements. Magnetic data show the Bounty mineralisation is highly magnetic. The magnetic information has mainly been used to help map stratigraphy and structure, seeking favourable sites for mineralisation. An orientation transient electromagnetic survey showed that the Bounty orebody is a good conductor. More extensive surveys delineated an anomaly over the North Bounty deposit also, and discovered several other conductive zones which, so far, have been found only to be barren sulphidic shale and chert horizons.

Geophysical Setting of BIF-Hosted Gold Deposits at Tuckabianna, Western Australia

Lisa J. Vella
Hill 50 Gold Mine, Western Mining Corporation Ltd, P.O. Box 83, Mt Magnet, W.A. 6638 (formerly of Newcrest Mining Ltd)

Abstract

Tuckabianna Gold Mine is located about 25 km east of Cue, on the Mount Magnet-Meekatharra Shear Zone. The mine sequence consists largely of basalt, dolerite to gabbro, mafic schists, banded iron-formation (BIF), and intrusive quartz-feldspar porphyry dykes and sills. Gold mineralisation is hosted by the NE-striking, E-dipping BIFs with shears localising the ore zones. Laterite derived from the weathering of these BIFs may contain a significant gold resource.

Downhole logging has shown that the BIFs typically have lower relative gamma activity and higher densities, resistivities and susceptibilities compared with the mafic units and porphyry.

Petrophysical measurements of magnetic susceptibility, anisotropy of magnetic susceptibility and natural remanent magnetisation have characterised two BIF types, although no relationship between gold mineralisation and the BIF types has been conclusively demonstrated.

Tuckabianna's regional geophysical dataset consists of Bureau of Mineral Resources (BMR) aeromagnetic and gravity data and high-resolution aeromagnetic and radiometric data. Of these, the most useful have been the high-resolution aeromagnetic data, because they clearly define the BIFs and structures which can localise gold mineralisation. Such lithological and structural detail cannot be recognised in either the BMR regional magnetic and gravity datasets or the high-resolution radiometric dataset.

The Geoscan remote-sensing system has been flown over Tuckabianna. However, the laterite cover (1-21 m thick) has blanketed much of the geology and only some rock types and major lineaments can be identified from the data.

Ground geophysical surveys have been dominated by the magnetic method, which has been extremely useful in delineating the BIFs and structural features, as has the gravity method. Electrical surveys, including magnetometric resistivity, induced polarisation (frequency and time-domain) and electromagnetic methods have also been used. These electrical techniques have not been completely successful in the direct detection of mineralised zones. However, the resistive nature of the BIF is such that these methods may be successfully used to locate the BIF and porphyry, in addition to delineating some structures.