FIELD TRIALS OF THE BIASSED HETERODYNE METHOD OF EXPLORATION OF EXPLORATION FOR SULPHIDE MINERALS

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The Biassed Heterodyne (BH) method uses the fact that sulphides are semi-conductors hence electrical junctions between sulphide grains can be non-linear in terms of current through versus potential across the junction. Other conductors in the earth such as electrolytic pathways, clays and graphite are likely to conduct electricity in a linear fashion. By galvanically transmitting two frequencies into the ground, intermodulation frequencies are generated in areas that have a significant proportion of non-linear conduction from sulphide minerals. These intermodulation frequencies should be able to be measured to map the subsurface location of sulphide bodies. Laboratory tests have shown the desired signal is extremely weak compared to the transmitted signals and so a DC bias signal is also transmitted to enhance the heterodyne signal and aid in noise reduction.

Field tests of the method have been conducted at the Kempfield silver barite deposit near Bathurst NSW. The tests were conducted over an area of known massive sulphide mineralisation. Three IP transmitters were used for the primary and bias signals. These were arranged in a gradient array configuration. The two primary transmitters were run to produce 50 and 80Hz square waves such that the difference heterodyne frequency of 30Hz lies in the minimum between telluric and sferic natural noise. The bias transmitter is a standard castle waveform IP transmitter operating at 0.03125 Hz (8 second pulses). The primary signals are transmitted by modified GGT 30 Zonge IP transmitters. The receiver is a high sensitivity, high dynamic range A to D converter and spectrum analyser.

It is hoped that processing of the data can use the difference in heterodyne signal between the different periods of bias signal, such as the difference between positive and zero bias, to reduce noise to a level such that the difference intermodulation signal can be seen above the noise and thus be used to map subsurface sulphide minerals