



Australian Society of Exploration Geophysicists

JOINT SMEDG-ASEG Technical Talk
5.30 for 6.00 pm Thursday July 28, 2022
Function Centre, Level 2
Club York, 95-99 York Street, Sydney

This will also be broadcast on Zoom – To register please follow this link
https://us02web.zoom.us/webinar/register/WN_aLKzFUlwRt2-b_UgzSVwOA

**A completely different geophysical way to explore for sulphides.
Heterodyne method - latest progress and field results.**

Steve Collins (presenter), Bob White, Keith Leslie, Andrew Slood

Abstract

How many ore deposits lie at relatively shallow depths but are invisible to geophysical methods, because they are submerged in graphitic black shales? How many thousand strike kilometres of graphitic black shale are prospective for base metal sulphide deposits? The heterodyne method addresses the problem of distinguishing sulphides from graphite.

As a retirement 'project' (aka hobby) our intrepid team of wrinkly geophysicists has been researching the possibility of using the semi-conducting properties of sulphide minerals to develop an electrical method of detecting subsurface sulphide deposits which does not respond to graphitic black shale. In the future, the method also has the potential for detecting poorly conducting lead zinc mineralisation such as Mississippi Valley style or Broken Hill which may otherwise be invisible.

This project, largely funded and supported by Fender Geophysics, follows up on work done by Bob White nearly half a century ago. The field operation of the method, superficially, looks like Induced Polarisation but is based on an entirely different physical property. If it can be shown to work, it is

envisaged that field surveys using this technique will be incorporated into IP surveys as most of the logistics involved is identical. The method may also be amenable to airborne implementation since laboratory tests indicate that the frequencies at which it can operate extend into the range usually used in electromagnetic surveying.

Several field surveys have been run at Argent Minerals' Kempfield deposit and the latest of these strongly suggests that method works, - responding to sulphides but not to black shales. This work needs final verification but the authors of this talk feel that the Holy Grail is now within grasping distance.

The talk covers the history of development, and (in words of one syllable, where possible) the theory behind the method. The latest field results will be discussed together with plans for future work and further development.

Biographies

Steve Collins has a BSc in physics and an MSc in geophysics from Macquarie University. He has over 40 years' experience as a mineral exploration geophysicist for multi-nationals and as a consultant. He has been a member of ASEG for 45 years and was on the organising committee of SMEDG for nearly two decades. He is an honorary life member of SMEDG and has been awarded the Lindsay Ingall award by the ASEG.

Bob White has an MSc degree in geology and geophysics from Macquarie University. He has more than 40 years' experience as a practical mineral exploration geophysicist both as a company employee and as a consultant.

Keith Leslie currently multi tasks between his roles of CSIRO mentor, grandfather, dinghy sailor and collecting and analysing data for the non-linear sulphide project. He is also working at CSIRO with Clive Foss on characterising magnetic signatures of meteorites and some local objet d'art.

Andrew Sloot is a graduate of Macquarie University and is the owner of Fender Geophysics, a Sydney base geophysical contracting company. Fender is the engine under the bonnet of this project and provides financial, logistics and moral support. Andrew has been on the SMEDG committee since 2010 and also holds the ASEG Lindsay Ingall award.

