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# Minerals geophysics

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## Championing old data

With continuing advances in geophysical exploration technology, and the ability we now have to collect and store a wealth of data, geophysical survey results from the past can be overlooked. I feel motivated to champion old data. My introduction to exploration geophysics was an ABEM vertical component torsion magnetometer survey at Nobles Nob mine near Tennant Creek over 50 years ago - although I'm not necessarily advocating that we go back that far. Our industry has undergone significant structural changes over the past 50 years, and there was arguably a longer term outlook in the past. Some of the larger mining companies had in-house crews, and embarked on some very extensive and systematic ground geophysical surveys. These old data could be valuable assets.

Often the first reaction to older geophysical data is 'Oh, that's old, it can't possibly be any good'. Granted, some of the data may be pretty basic, were collected with less sophisticated instruments and may not be in the most convenient, digital format. However, it is free (or relatively cheap), and it is readily available. In Australia there are legislative requirements that exploration results be reported to the responsible government body, usually to what used to be the State Mines Departments. These departments have been diligent in collecting and then releasing results in Open File form. If you are fortunate the original geophysical survey data will also have been collected and released. If not, you may be able to track it down in company or contractor files. In some instances commercial organisations have re-packaged the data for resale.

Early data were often slow and laborious to collect and, as a consequence, greatly valued. Results were read off dials and recorded by hand, and the instruments could be temperamental. Operators were, by necessity, intimately involved in the survey and their equipment - there was no simple pressing of a button and it's done. On the negative side, there was more chance of a mis-reading, fewer parameters could be measured, and the measurements were less accurate. Early gravity surveys levelled with a barometer are a case in point; clearly some data can't be pushed too far. With the advent of storage systems, data, whether analogue or digital, could at least be recorded and re-accessed later. Whether the storage media has survived and the data can still be retrieved is, of course, relevant.

Also to be considered is the previous treatment of these data. Presentation, processing and interpretation were often quite simplistic, limited by lack of computing power and CAD facilities. Results were presented as hand drawn profiles and contours, processing was done with a small calculator (or even a slide rule), and interpretation limited to model matching; there were no inversion routines. Think what modern processing and inversion techniques might extract from these data. True, it may require considerable effort to get the data into the necessary format, older data may have to be digitised and perhaps physical locations recovered, but it's worth at least looking at.

And, even if the data are inadequate – not enough power to see through the cover, not accurate enough to discriminate the subtle signals, not measuring the right parameter – there's still information to be had on the physical environment that may be pertinent to future surveys. Are there surficial conditions (silcrete, maghaemite) that need to be taken into account, is there conductive cover (deep weathering, younger sediments) to be penetrated, will the country rock cause problems (conductive, IP anomalous carbonaceous pyritic shales for example)? Valuable geo-environmental information may be gleaned from old survey data, even without re-processing.

Finally, as a special case, consider geophysical data collected pre-mining. It's irreplaceable. Once mining has begun, and infrastructure is established, the opportunity to develop a better understanding of the geophysical character of a deposit is lost. Before and after aeromagnetic surveys of the Ernest Henry deposit illustrate the point. The pre-mining 1970s survey (Figure 1) has 200 m line spacing and 60 m terrain clearance (here downward continued for comparison purposes) – the modern during-mining survey (Figure 2) has 50 m line spacing at 30 m terrain clearance. No matter how sophisticated the processing regime it is not possible to recover the magnetic signature of the Ernest Henry deposit from the post-mining survey.

So, the next time you're confronted with old survey data, give it a second look. There might be some effort involved, but it could deliver targets or at least provide information to help design a new survey. And it's already been collected!

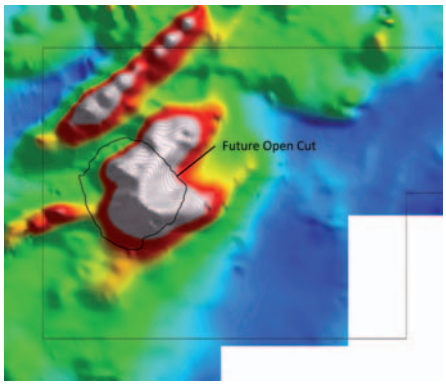


**Figure 1.** *Ernest Henry deposit pre-mining (RTP image of magnetic survey data).*

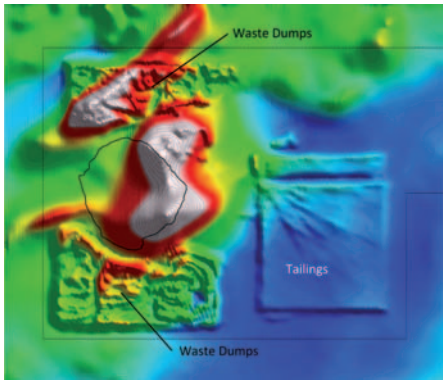


**Figure 2.** *Ernest Henry deposit during mining (RTP image of magnetic survey data).*