FAA- Site # 4: Broken Hill –NSW Australia

The Broken Hill zinc lead silver ore bodies are located 40 km east of the South Australian border in far western New South Wales, approximately 950 km WNW of Sydney. The Broken Hill district is one of the world's premier Pb-Zn-Ag deposits. Estimates of the premining and pre-erosion resource vary but are generally in the order of 280 Mt grading 10 percent Pb, 8.5 percent Zn, and 150 ppm Ag with a strike extent of over 7 km. The Main lode ore lenses have supported several independent mining operations that played a significant part in the history of major mining companies such as BHP, Rio Tinto, North, and Pasminco (Parr and Plimer 1993).

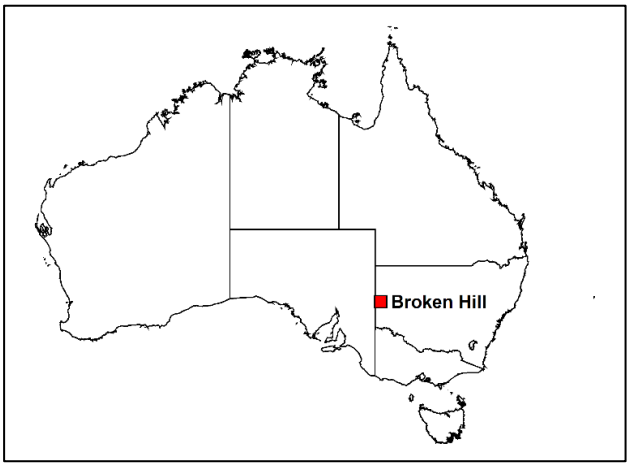

Figure 1: Location of Broken Hill, NSW, Australia.

Geological Summary

The Broken Hill deposits lie within the Willyama block which extends from far western New South Wales into eastern South Australia and is composed of Paleoto Mesoproterozoic metamorphic rocks and minor intrusives. The Willyama block is overlain by Neoproterozoic sedimentary cover which separates it from the similar rocks of the Euriowie Block to the east, while the equivalent Olary block to the west in South Australia is separated from the Willyama Block by younger cover. The Willyama block is largely occupied by the metamorphics of the ~7 km thick, ~1,720 to ~1,640 Ma Willyama Supergroup which comprises amphibolite to granulite facies schists and gneisses. It has been interpreted to represent a metamorphosed protolith of clayey and sandy sediments with intercalated basic and felsic volcanics and minor subvolcanic intrusives. Basement rocks to the Willyama Supergroup are not exposed, but is believed to be Achaean and older Palaeoproterozoic crystalline crust.

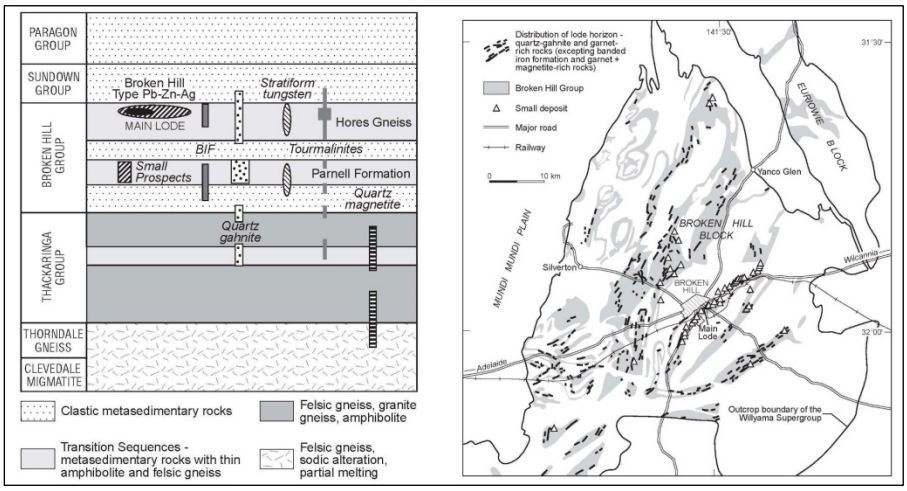

Figure 2: Schematic summary of Broken Hill block lithostratigraphy (left) Mapped outcrop distribution of the Broken Hill Group and quartz-gahnite lode horizon markers in the Broken Hill block (after Walters 2002).

Geophysical Data Summary

There is an extensive suite of ground and airborne geophysical data available over the Broken Hill area. Included are ground and airborne gravity (Falcon), magnetic and radiometrics as well as Hymap HyperSpectral imagery and some seismic data. Also as part of the Broken Hill Exploration Initiative (ran from 1994 to 2000) supported by the state and federal governments, there were numerous assessments of the various data sets and additional work on petrophysics of the ore and host rocks. Figure 3 shows the TMI and Falcon gD results centered over the main part of the Broken Hill area.

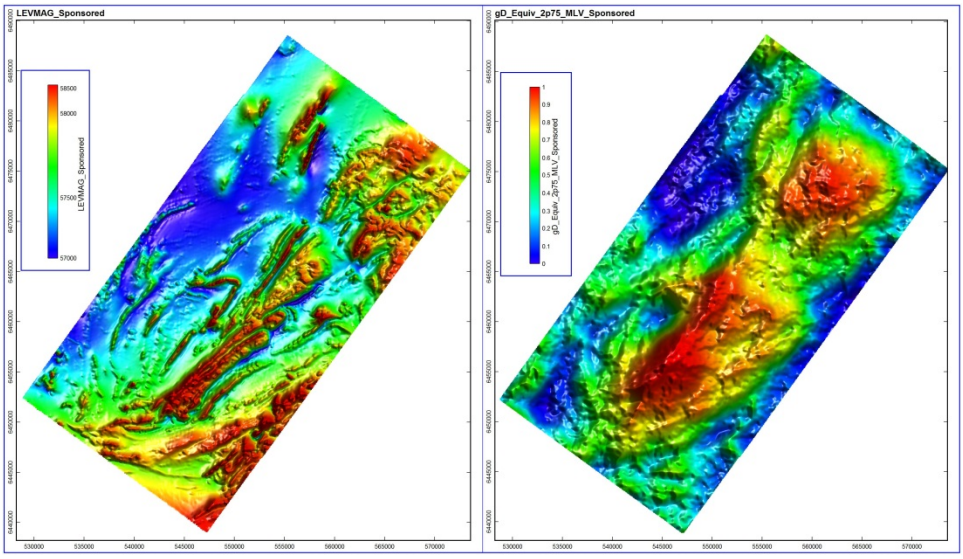

Figure 3 TMI and Falcon gD

Geological Data Summary

There is an extensive range of geological maps and assessments available for the Broken Hill area, commensurate with the economic importance of the district as well the unique aspects of the geology.

Exploration Challenge

Since the discovery of the Broken Hill camp over 100 years ago, there has been an enormous amount of exploration work in the study area. New resources in the camp are likely to be found at greater depths than before and to find these deposits will require a good understanding of the known geology and an innovative use of the geophysical and other geoscience data sets.

Data Source Acknowledgments

Geological Survey of New South Wales, NSW Department of Primary Industries, Government of New South Wales.

Preferred Projection

WGS84 datum; UTM 54 South

References

Parr, I.M., and Plimer, I.R, 1993, Models for Broken Hill-type lead-zinc-silver deposits, *in* Kirkham, RV., Sinclair, W.D., Thorpe, RJ. and Duke, J.M., eds., Mineral deposit modeling: Geological Association of Canada Special Paper, v. 40, p. 253-288

Walters, S. Skrzeczynski, B., Whiting, T., Bunting, F. and Arnold, G. 2002, Discovery and Geology of the Cannington Ag-Pb-Zn Deposit, Mount Isa Eastern Succession, Australia: Development and Application of an Exploration Model for Broken Hill-Type Deposits Society of Economic Geologists, Special Publication 9, p. 65–93.

http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers/geoscience-information