

**“ A comparative petrological and geochemical study of garnetiferous
rocks associated with base metal deposits in the Kanmantoo Trough:
meta-exhalites or synmetamorphic alteration zones?”**

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ABSTRACT

Garnetiferous rocks show a spatial association with several base metal deposits in the Early Cambrian Kanmantoo Trough. These rocks include cotiules (garnet-quartz rocks) and banded iron formation (BIF) and are hosted by pelitic metasediments of the Tapanappa Formation. Petrological and geochemical investigations have been made of garnetiferous rocks associated with the Scotts Creek Ag-Pb-Zn and Angas Pb-Zn deposits and in the vicinity of the Kanmantoo Cu deposit.

Geochemical features indicate variations between cotiules from the three localities but general similarities with cotiules from Broken Hill, N.S.W. BIF from the Kanmantoo area is also comparable to the equivalent lithologies in the Willyama Complex, at Olary and Broken Hill. Geochemical diagrams ($Fe-Mn-(Co+Cu+Ni)$, $Al/(Al+Fe+Mn)$ vs Fe/Ti , TiO_2 vs. Al_2O_3 and chondrite-normalised rare earth element (REE)) for cotiules and iron formations suggest variable contributions of detrital and hydrothermal components. The hydrothermal component, is generally 30 to 50 wt. percent for cotiules, and >70 wt percent for BIF.

The stratigraphic position, layer parallel banding and unusual geochemistry suggest the cotiules associated with Scotts Creek, Kanmantoo and Angas deposits are exhalative in origin, and may be termed "meta-exhalites". The Kanmantoo BIF appears to have formed from high temperature submarine hydrothermal fluids and metalliferous sediments analogous to those of the Red Sea and the East Pacific Rise.

Cotiules and BIFs are indicators of hydrothermal activity and may be local guides to base-metal mineralisation. The Mn content of garnet in cotiules reflects proximity to Pb-Zn ore, and may be a useful exploration tool.

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