

Neutralising Cobar-type mineralisation: an emerging distal skarn model for the Hera-Nymagee orebodies and beyond...

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The Hera and Nymagee orebodies and subsidiary prospects of the southern Cobar mining field in central New South Wales preserve a complex gangue mineralogy that reflects siliciclastic turbidite-hosted calc-silicate veins/skarn and remnant carbonate skarn. The orebodies and skarn are hosted within and locally transgress a discrete sedimentary package comprising siliciclastic turbidite, grits and rare carbonate blocks/clasts. Skarn at the Hera Au-Pb-Zn-Ag orebody displays a broad south to north zonation from garnet-biotite-actinolite-rich to biotite-tremolite-rich (garnet-absent) associations in siliciclastic rocks and garnet-diopside-rich to tremolite-anorthite-rich (garnet-absent) associations in remnant carbonate blocks/clasts. All high-T associations are pervasively retrogressed to actinolite/tremolite-biotite-zoisite-rich hydrous retrograde skarn, which is associated with the main phase of sulfide mineralisation throughout the Hera orebody. Skarn mineralogy of the nearby Nymagee orebody is less well understood, but a high-T gangue assemblage of garnet-tremolite (after clinopyroxene)-anorthite-zoisite is locally preserved in association with Pb-Zn-Cu-rich lodes. High-T skarn mineralogy at Nymagee is retrogressed to tremolite-chlorite-illite-talc-rich associations and hydrous retrograde mineral associations are again associated with the main phase of sulfide mineralisation. Petrographic relationships and mineral chemical data for the southeastern Cobar-type deposits are consistent with a distal calcic (Zn-W) skarn at the Hera orebody and calcic Zn-Cu to Fe-skarn at the Nymagee orebody, while isotopic data suggest a magmatic (water-sulfur) input to mineralisation and hydrous retrograde skarn formation. In addition to the well-documented importance of structural pathways for Cobar-type deposits, the emergence of a skarn related mineral system highlights the importance of reactive host sequences (stratigraphic traps) and helps to bring clarity to the often inferred magmatic source for metal-bearing fluids. Whilst focusing on the Hera-Nymagee orebodies, we will also present the details of metamorphism/heat distribution within the Cobar Basin and its relationship to magmatic rocks and mineralisation. We will touch on the distribution and details of other skarn prospects in the Cobar Basin and conclude with some implications for the origin of the 'sister' Cobar-type orebodies to the north in the main Cobar mineral field.