

Epithermal Ag-dominant mineralisation within the Drake Goldfield, Southern New England orogen, north-eastern New South Wales

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White Rock, White Rock North, Lady Hampden and Silver King are four Ag-dominant low-sulfidation epithermal deposits that form part of the larger Mount Carrington Project (which contain eight near-surface Au-Ag deposits), located ~ 5km from Drake in north-eastern New South Wales. Mt Carrington has an estimated Mineral Resource of 338koz Au and 23.4Moz Ag. The deposits are hosted by the Late Permian Drake Volcanics, within the Southern New England Orogen. The Drake Volcanics form a 60km long and 20km wide north to northwest-trending belt of intermediate to felsic volcanics consisting predominantly of andesitic and minor felsic volcanic rocks that have been intruded by their high level, porphyritic counterpart. The Drake Volcanics overlie the older Carboniferous Emu Creek Formation to the east and to the west the Drake Volcanics are faulted against Late Permian to Early Triassic leucocratic granitoids of the New England Batholith.

Mineralisation hosted within the Drake Volcanics is primarily centred on the Drake Quiet Zone, a circular 20km diameter zone of low magnetic signature. The primary host lithologies of the four deposits and the intensity of argillic alteration are slightly different. Mineralisation within the Lady Hampden and Silver King deposits is hosted within andesitic volcanoclastic lithic tuffs and more intensely altered, while at White Rock and White Rock North, the mineralisation is hosted within less altered crystal-lithic vitric tuffs and coherent domes varying in composition from andesitic to rhyolitic. At White Rock and White Rock North, the mineralisation occurs in veins and stockworks, whereas at Lady Hampden and Silver King the mineralisation is disseminated and quartz poor with little to no veining.

The primary silver minerals within the four deposits are native Ag, acanthite, argentotennantite and pyrargyrite, with stephanite, proustite, and polybasite only found within the White Rock North deposit. These silver minerals are typically associated with pyrite, galena, Fe-poor sphalerite, and chalcopyrite and are always late in paragenesis in comparison to the other sulphides. Electrum was only found in the Lady Hampden deposit and is hosted within early carries-textured pyrite. Covellite is rare in the deposits. The abundance of silver also varies between the deposits, with White Rock and White Rock North being much more enriched in Ag compared to the Lady Hampden and Silver King deposits.

Argentotennantite in the deposits contains Ag (up to 17.4wt%), Cu (up to 31.8wt%), As (up to 9.4wt%), Sb (up to 24.3wt%), Zn (up to 8.3wt%), and Fe (up to 1.8wt%). Galena has a Ag content up to 0.65% and Bi ranging from 0.14 to 0.38wt%. Sphalerite is typically characterised with very low to low Fe (ranging from 0.23 to 2.5wt%), In (up to 0.03 wt%), Bi (up to 0.2wt%), and Ag (up to 1.4wt%). Chalcopyrite in the deposits occurs as both discrete grains and also as exsolution blebs within Fe-poor sphalerite, though there is no noticeable variation in composition for these two textural types.