

## **Setting and Style of VHMS Mineralization in the Eastern Goldfields Superterrane, Western Australia: Insights from the Ag-Zn-(Au) Nimbus Deposit**

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Economic VHMS mineralization in the Yilgarn Craton is largely restricted to two main zones of juvenile crust as revealed through regional (Nd, Pb) isotope variations. Interpreted as Archean paleorift zones, one of these is oriented north through the central Eastern Goldfields Superterrane and is associated with the high-grade Teutonic Bore, Jaguar, and Bentley deposits, plus subeconomic VHMS mineralization to the south (e.g., Anaconda, Erayinia) and northeast (e.g., Tuff Hill, Mason Hill). The Nimbus Ag-Zn-(Au) deposit (4.9 Mt at 149 g/t Ag equiv) is located approximately 265 km south of Teutonic Bore, near the margin of this paleorift zone and 17 km ESE of Kalgoorlie. The local stratigraphy comprises a NW-trending and steeply dipping bimodal-felsic package of volcanic rocks (i.e., FI affinity quartz-feldspar porphyritic dacite and lesser basalt, plus their autoclastic equivalents) with subordinate carbonaceous black shale, chert and polymict conglomerates.

Primary sulfide mineralization occurs as a series of stacked plunging lenses. Early well-developed massive pyrite is underlain by (1) semimassive, stringer and, breccia-type Ag-Zn ± Pb (Cu-Au) sulfides (including pyrite, sphalerite, galena, pyrrargyrite, merrillite, boulangerite, arsenopyrite, chalcopyrite, and tetrahedrite) associated with the autoclastic facies of a thick unit of dacite; and (2) stringer and disseminated sulfides (dominated by pyrite and sphalerite) in largely coherent pseudobrecciated dacite at depth. Hydrothermal alteration is characterized by extensive and pervasive quartz-sericite-carbonate.

Compared to other VHMS occurrences in the Yilgarn Craton, the Nimbus deposit is unusual in terms of its tectonostratigraphic position, the geochemistry of its host sequence (i.e., FI affinity felsic volcanic rocks, ocean-plateau like low-Th basalts), mineralogy (e.g., low Cu through most of the deposit, abundance of Ag and Sb sulfosalts) and alteration assemblages (e.g., lack of chlorite, presence of Cr-V-rich micas). Classification of Nimbus as a shallow-water and low-temperature VHMS deposit with epithermal characteristics (i.e., a hybrid bimodal-felsic deposit) is consistent with its position near the margin of this paleorift zone.