

The Geology and Origin of Sedimentary Manganese
From the Boolcunda, Etna, and Muttabee Deposits,
central Flinders Ranges, South Australia

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ABSTRACT

The origin of small manganese deposits from the central Southern Flinders Ranges, has not previously been adequately discussed. The region comprising these sedimentary manganese accumulations incorporates a sinuous folded sequence of thick variegated clastic and carbonate sediments deposited within the Adelaide Geosyncline, the stratotype basin for the Adelaidean sediments delineated.

Extended exposure of the craton to the west provided a dominant source of both sedimentary detritus and manganese ore constituent. Paragenesis involved leaching of manganese from this source region, transport into the aqueous system and subsequent precipitation in favourable shallow-marine environments meridionally within the Adelaide Geosyncline.

Cyclic eustatic fluctuations increased potential ionic manganese concentration, with remobilisation and concentration during transgressive oxygen deficient phases and oxidation and precipitation during alternate regressive more oxygenated phases.

The precipitation of particulate manganese-oxides, from pre-existing particulate and dissolved manganese from an enriched reservoir, was controlled by the interactive response of a number of features : estuarine circulation, anoxic-oxic water stratification; and sediment-water interface relationships, at specific geomorphological sites on a stable shallow-marine continental platform. Retention of the precipitated manganese resulted from rapid burial by regressive sands and silts, with little post-genetic supergene alteration of the deposits observed.