

# South Australian magnetite – the geology behind the opportunity

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## **ABSTRACT (USE 'HEADING 1' STYLE)**

South Australia has a long history of iron ore mining and steel making and was the birthplace of these industries in Australia. Since the early 2000's exploration and feasibility work has outlined an extensive inventory of magnetite-dominated iron ore resources in the state. In excess of 16Bt of magnetite-dominant iron ore resources have been defined with exploration targets suggesting potential for between a further 30-79Bt of magnetite ore. This paper serves to discuss the geological framework and ore genesis processes and how they have led to deposits that are characterised by low deleterious impurities, large grain sizes &/or relatively soft ore that achieve high concentrate grades with low energy inputs.

Most iron ore resources in South Australia occur within the Neoproterozoic sequence of the Gawler Craton and the Neoproterozoic sequence of the Adelaide Rift Complex. Gawler Craton deposits are hosted by Neoproterozoic and early to late Paleoproterozoic volcano-sedimentary sequences. Subsequent orogenic processes, in particular metamorphism to amphibolite facies, have altered primary iron oxides to magnetite resulting in meta-BIF with magnetite as the primary iron oxide. Magmatism related to the c.1590Ma Hiltaba event also contributed to the formation of magnetite metasomatite and iron-skarn deposits. Within the Adelaide Rift Complex the laterally extensive Braemar Ironstone occurs as a basal member to a thick succession of Sturtian Tillite (c.700-663Ma) and is typically of greenschist metamorphic grade. Genesis of these deposits is related to a global ice-age event.

A unique combination of the geological settings and geological processes through time have acted to form magnetite deposits with characteristics that make them superior to deposits from most other provinces, presenting an opportunity for establishing South Australia as a jurisdiction to supply high grade iron ore concentrates to compliment the nations existing iron ore production.