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Mineralogy and distribution of talc associated with Cu Mineralisation: A study of talc alteration in the Northern 3500 Orebody, Mount Isa, Queensland

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Abstract

Copper mineralisation within the Mount Isa Mines deposit is associated with variable talc alteration. An understanding of the mineralogy and distribution of talc alteration associated with the northern 3500 orebody is important for future mining processes and could potentially be used for exploration targets around the Mount Isa area.

Mineralogical and geochemical investigations have shown one major type of talc mineralogy throughout the entire 3500 orebody. Variations in colour and texture are visible macroscopically and microscopically but there are no distinctive differences in mineralogy. The talc has minor iron (~4 wt% FeO), probably due to the moderate iron within the Mount Isa system. The same type of moderately Fe-rich talc is found within the 1100 oreobody (Waring, 1990), suggesting a similar style of talc alteration extends beyond the 3500 orebody.

The distribution of talc is reliant on the fluid pathway. The altering fluids have used selected faults within the 3500 orebody as pathways. The NSFW fault which roughly defines the eastern limit of mineralisation in the 3500 orebody is typically a strong wide shear zone with talc fill and is recognised as being a possible pathway for the fluids. Talc is dominant on the footwall of the 3500 orebody from south of 6700mN and dominant on the hangingwall, north of 6700mN. Within the siliceous core where mineralisation is at its greatest concentrations, talc is only located within faults.

Outside the siliceous core where copper mineralisation is lower, talc alteration is present within the rocks and varies in quantity.

The talc alteration has occurred after the formation of dolomite and pyrite. However, the timing of the talc alteration in relation to the copper mineralisation remains unknown.

Four methods of determining the most accurate and cost effective method for talc abundance estimates within the 3500 orebody are evaluated. The most effective method is through the calculation of stoichiometric equations from XRF assay data. These calculations can be used to create an accurate talc 3D numerical model that enables the distribution and numerical quantity of the talc to be viewed throughout the copper mine.