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Foliation Boudinage Structures at the Mount Isa Cu-Pb-Zn System, Australia

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Foliation boudinage structures are vein-like boudin structures that form in highly anisotropic and homogenous rocks during layer parallel extension and layer normal shortening events. These structures may have a more significant role in the formations of ore bodies than previously thought. At Mount Isa, the finely laminated steeply West dipping Urquhart Shale contains the breccia hosted Cu and stratiform Pb-Zn ore bodies and provides the homogeneity and anisotropy required for the formation of foliation boudinage structures. Through detailed structural drill core logging in the Mount Isa Cu-Pb-Zn system, the necklines of drill-core scale foliation boudinage structures have been shown to plunge gently to moderately to the North or South and indicate the approximate intermediate strain directions during a regional ENE-WSW shortening event. These foliation boudinage structures have an initial rim of quartz and dolomite, with a later pyrrhotite fill with minor co-genetic to late chalcopyrite in some samples. Increasingly deformed and altered lithologies exist closer to the Cu ore bodies, where there is a general trend of increasing high-grade Cu with deformation. The abundance of pyrrhotite and the relative absence of Cu from the infill of the small-scale foliation boudinage structures suggests the structures are within the silica-dolomite and pyrrhotite mineralisation zones whilst being outside of the chalcopyrite breccia zone of high-grade Cu. Foliation boudinage structures are located predominantly in the least deformed shale lithologies, and drillhole intervals with foliation boudinage structures show an overall lower Cu% when compared to the entire drillhole length. The small-scale foliation boudinage structures could be used as a targeting and localisation tool for future exploration drilling at the Mount Isa system. Further work is needed to test for the existence of larger scale (metre to 100s metres) foliation boudinage structures which might have played an important role in ore body localisation and orientation.