3-D Architecture of the Jervois Cu-Pb-Zn Deposit, Northern Territory, Australia

Peter Schaubs* and Susanne Schmid

CSIRO Mineral Resources Flagship, Kensington, Western Australia 6151, Australia

*E-mail, Peter.Schaubs@csiro.au

The Jervois deposit is situated in the Arunta Region within the southern part of the Northern Territory, approximately 350 km E of Alice Springs. Most of the mineralization is hosted in the Bonya Metamorphics (1790–1770 Ma), upper-greenschist to middle amphibolite facies metamorphic rocks including muscovite schist, muscovite-biotite schist (± cordierite, andalusite, garnet), marble, calc-silicate rock and meta-quartzite.

Structural analysis from outcrop and core observations shows that at least three ductile deformation folding events occurred in the Jervois district resulting in a complex multifolded stratigraphy with repeating sediment-hosted mineralization. Faults and fractures are related to the youngest deformation event (syn-post D_3) and offset the mineralization. Bedding is represented by distinct marker units such as marble, meta-sandstone and tourmalinite that can be traced along strike across the Jervois "J-fold." The overall shape of the Jervois deposit is defined by structures of the youngest ductile deformation identified at Jervois, which is here termed D_3. It is represented at the map scale by the prominent F_3 synformal J-fold that covers the tenement area and plunges to the north.

Structures associated with D_2 are the most common features observed at Jervois. The ubiquitous steeply dipping S_2 axial planar cleavage wraps around the J-fold and as such changes orientation from west dipping in the north (Morley/East Reward) to north-dipping in the south within the hinge of the F_3 J-fold. In outcrop F_2 folds occur as subhorizontal to moderately plunging tight to isoclinal folds with wavelengths of 1-3 m. Their plunge is somewhat variable which is in part due to their interaction with older isoclinal (and likely recumbent) F_1 folds. At the map scale, tight to isoclinal folds defined by key marker beds such as marbles, calc-silicates, and tourmalinites, are interpreted to be F_2.

Structures attributed to D_1 deformation are the most cryptic at Jervois. S_1 is very rarely identified in the field and it is interpreted that in most cases S_1 and bedding have been transposed into parallelism. F_1 folds interpreted to be steeply plunging and are most commonly found in marbles and calc-silicates rocks where they are defined by quartz-rich layers, which are deformed into tight to isoclinal folds.

Mineralization is interpreted as being stratiform and Cu-Pb-Zn zones are repeated as a result of both F_1 and F_2 folding in both the Bellbird and Marshall-Reward areas. Zonation of Cu, Pb, and Zn is spatially parallel to the marble/calc-silicate rock and quartzite marker units and bedding representing the distribution pattern of the primary mineralization. Minor secondary remobilization can be seen along faults and fractures offsetting the primary mineralization. Unravelling the complex deformation history helps to understand the primary stratiform mineralization and secondary enrichment pattern during remobilization. We interpret that tight to isoclinal F_2 folds led to 50-m-wide zones of repeated mineralization that extend to a depth of at least 600 m below surface.