An innovative structural hypothesis established during target generation for gold and copper mineralisation in the Cobar district, NSW Australia

Corresponding author: Lize Stander, Newgold, lize.stander@newgold.com

The Cobar basin is a complex geological environment resulting from one extensional followed by four compressional deformational events within an intracratonic Siluro-Devonian turbidite sequence. This paper covers the area known as the Cobar Gold Field, between the town of Cobar and the Perseverance deposit 10km to the south. Six significant orogenic copper-gold deposits are known to occur along this zone, with four currently being mined by New Gold.

The Cobar Gold Field has been explored for decades, with almost every possible exploration method applied, yet without full appreciation of the three dimensional geological context. Recently a three dimensional computer model has been developed by New Gold to better clarify the geological setting of the known copper-gold deposit in relation to regional scale controls to mineralization. The model draws upon the integration of geological mapping and gravity data draped over surface topography, with existing drilling data and deposit locations.

The geological setting of the Cobar Gold Field comprises a north-northwest orientated mega boudin within Nurri Group sediments. The western margin of the boudin is defined by the Great Cobar Fault and the eastern margin by the Great Chesney Fault. The centre of the boudin forms a south-plunging anticline with parasitic folds plunging to the north and south.

The Great Cobar Fault is a steep west-dipping normal fault. The Great Cobar, Peak and Perseverance deposits occur within dilational zones proximal to the eastern side of the fault, in the footwall.

The Great Chesney Fault is a steep east-dipping reverse fault. The New Cobar and Chesney deposits occur within dilational zones proximal to the western side of the fault, in the footwall.

The two structures form a boudin neck in the centre of the Cobar Gold Field which opens up to the north and south. New Occidental is a so-far unique deposit, located immediately north of the boudin neck, in the pressure shadow of the mega boudin. The New Occidental location has a direct impact on its dimensions - a very narrow deposit with a short strike length and pipe-like geometry. It also has the strongest alteration halo of the deposits in the Cobar Gold Field due to the proximity of the two structures.

It is evident from the new model that economic gold and copper mineralisation within the Cobar Gold Field occurs in either a dilational zone within a single structure or within a pressure shadow created by the two structures. The area where the boudin neck opens to the south creates an unexplored pressure shadow. It is also possible that mineralised dilational zones may be present on the opposite side of the boudin from existing mines, for example a dilational zone present in the Great Chesney Fault opposite Perseverance.
The development of a new structural model using new tools on existing data has generated a new generation of innovative exploration targets at Cobar. Application of this approach is yielding promise as new targets are identified in areas that have undergone multiple exploration campaigns in the past.