

THE COBAR GOLDFIELD – A VARIATION OF A THEME

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Introduction

The Cobar Goldfield is located immediately east and extends to approximately 8 km south east of the Cobar Township. It is host to four geographically separate mines currently owned and operated by Canadian company, Goldcorp Inc.'s, 100% Peak Gold Mines Pty Ltd. Refer to Figure 1.

The gold and copper deposits of the Cobar field each have their own unique mineralisation and alterations signatures, but can be characterised based on these features. The deposits have characteristically short strike lengths, narrow widths and generally are most continuous down a steep northerly plunge (Stegman and Pocock, 1996). The shear zones which host the mineralisation include the Peak – Perseverance Shear, Blue Shear, Lady Greves Shear and the Great Chesney Fault. These northwest trending structures are clearly visible in magnetic data as distinct linear magnetic ridges. The southern extensions to these faults, particularly the Great Chesney Fault and the Peak Shear, together with unnamed structures to the west have stronger and broader magnetic responses than those which host the Central Area deposits to the north. This is related to more intense pyrrhotite alteration along the cleavage from Peak and to the south. While the presence of magnetite at deposits in the central and northern areas including New Occidental, Chesney, New Cobar and Great Cobar gives rise to shorter wavelength and discrete magnetic anomalies.

Two stages of deformation have been recognised within the field (Hinman, 1992). An early D1 event, although poorly preserved, is a remnant axial plane cleavage parallel to folds in the Peak area. The later event, D2, is responsible for the most pervasive cleavage is more regional in nature, but most strongly evident proximal to the shear zones in the field.

The proposed deposit groupings are as follows. Firstly, Group 1 is comprised of Peak and Perseverance, Group 2 – New Occidental, Chesney and New Cobar and Group 3 – Gladstone and Great Cobar. The parameters for grouping are based on metal ratios and content, host stratigraphy, mineralisation and alteration styles and curiously also northing with Group 1, southernmost and Group 3, northernmost. (Refer to 2)

Group 1

Peak and Perseverance, the southernmost group, are hosted by a variety of lithologies from Great Cobar Slate (DNG) to Chesney Formation sandstones and siltstones (DNC1 to DNC3) and rhyolite. The latter rock type is most characteristic of these deposits as it produces bonanza gold grades where it intersects mineralised shear zones. The rhyolite bodies are interpreted to have been intruded into wet sediments (Cook et.al., 1998).

The shear zones and subsequently, the orebodies within this group, have a steep, grossly west dipping attitude, but locally also dip east. At the top of Perseverance, from the 9405m level to about 9200m level the orebodies dip steeply west, however below 9200m level the ore bodies are vertical to steeply east dipping.

At Peak, the apparent displacement of the Great Cobar Slate and Chesney Formation contact across the Peak-Perseverance Shear is west block up by 250m (Cook et.al. 1998). This implies reverse movement. At Perseverance the apparent dip-slip displacement of stratigraphy is difficult to quantify. Intuitively it should be a similar amount, but there is still some debate as to the stratigraphy east of the Perseverance structure.

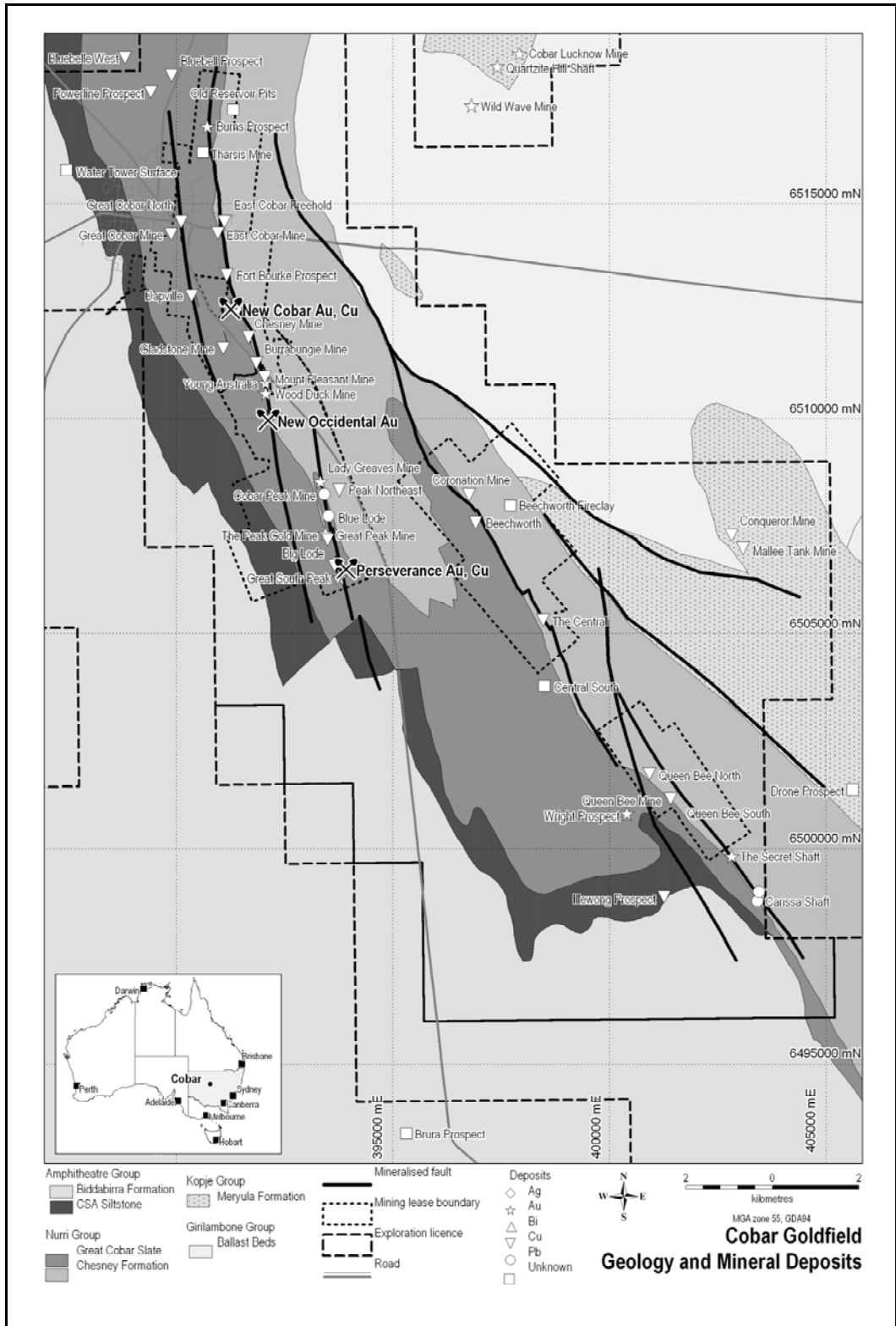


Figure 1 - Cobar Goldfield Geology and Perseverance Location plan

At both Peak and Perseverance the rhyolite body exhibits hyaloclastite textures predominantly on the northern margin of the easternmost rhyolite bodies (Cook et.al, 1996). At Perseverance, only one rhyolite body has been identified, while at Peak the geometries are more complex.

With depth, the pervasive alteration of green chlorite gives way to an increase in biotite alteration, particularly in close proximity to the ore zones. This is seen particularly below 9000m level in the southern Perseverance orebody known as Zone D.

Stegman and Pocock (1996) describe four styles of gold and base metal mineralisation at Peak. These being sediment hosted, contact zone hosted (sediment and rhyolite), volcanic hosted and late stage shear hosted mineralisation. At Perseverance, similar styles of mineralisation are seen, but with considerably less lead and zinc than that observed at Peak. The majority of ores mined at Perseverance fall into the sediment and contact hosted styles and have average grades of 9.4g/t Au, 1.6 % Cu, 0.12% Pb, 0.05% Zn, 11g/t Ag and 65ppm Bi.

High grades are seen particularly where the shears juxtapose favourable lithologies. These situations occur as two types. Firstly, siltstones faulted against thickly bedded sandstones ie. Great Cobar Slate (DNG) against Chesney (DNG21 or DNG23) () or secondly, sediment (siltstone or sandstone) faulted against rhyolite. (Refer to Figures 3, and 4)

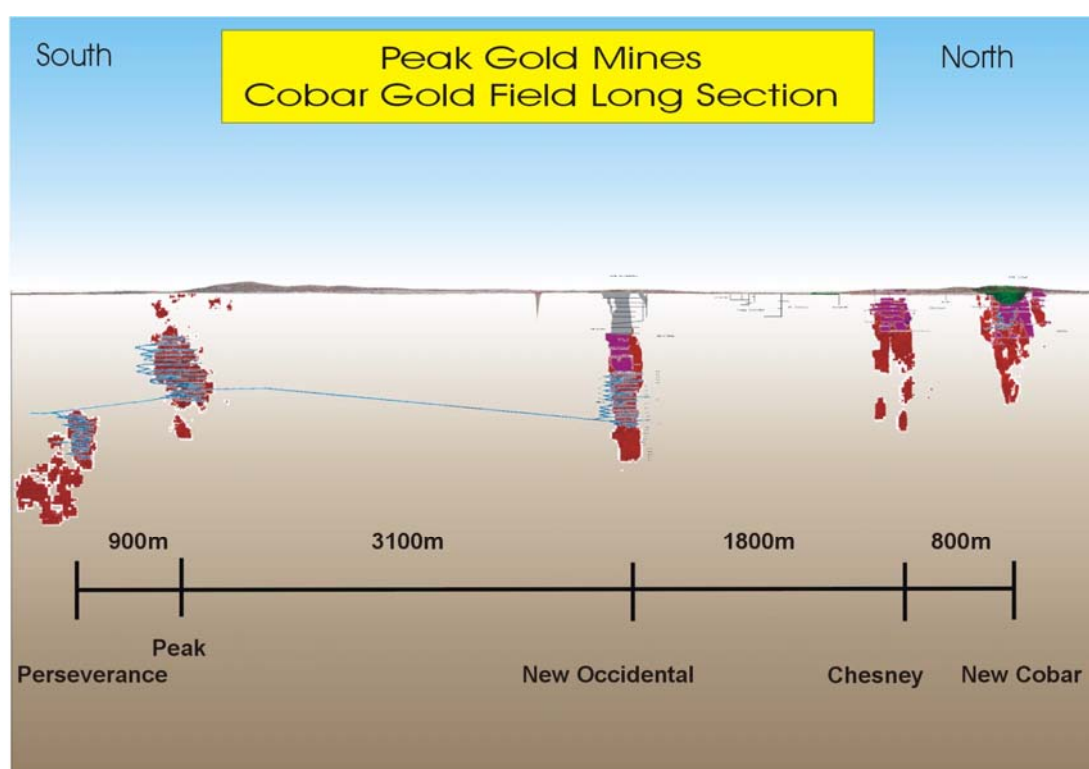


Figure 2 - Cobar Goldfield Longsection

Group 2

The second group consists of gold, gold – copper and copper – gold deposits hosted and controlled by the Great Chesney Fault and its related splays. These are from south to north, New Occidental, Chesney and New Cobar. All three mines have seen historic production, while New Occidental and New Cobar are currently in full production by the company.

These deposits have relatively simple geometries. The lenses have relatively short strike lengths less than 300m, are most continuous in the vertical direction and have widths of 5 to 30 metres (Stegman and Pocock, 1996) and have broad arcuate geometries. The Main lens of New Occidental bifurcates into an east and west lens. A weakly altered wedge of siltstone occurs within the deposit to the north (Refer to). New Cobar contains several recently identified, short strike length ore zones.

The most characteristic feature of these deposits is the early cryptocrystalline to chalcedonic silica veins which are closely associated with high-grade gold and bismuth mineralisation. New Occidental is the best example of the mineralisation style. Apart from a small but

vertically continuous lens, Gossan Lens, on the western side of the orebody, New Occidental does not have significant overprinting copper, lead or zinc mineralisation. A narrow quartz vein, often brecciated, occurs on the east side of the New Occidental deposit. It generally marks the hanging wall of orebody, although in some places this is not always the case with minor gold mineralisation occurring east of the vein. The western or footwall boundary is marked by a quartz breccia, locally known as the "Type four stockwork breccia" (Figure 6). Both Chesney and New Cobar have overprinting quartz veining, brecciation, pyrrhotite and chalcopyrite mineralisation. Much of the gold is remobilised by this later overprinting.

Early silicification and pervasive iron chlorite alteration is typical. Post cryptocrystalline to chalcedonic silica veins, is a coliform-banded, quartz – magnetite vein set which most commonly occur at New Cobar, but is recorded at Chesney and New Occidental. A different, splashy style of quartz magnetite intergrowths have been recorded at depth at New Cobar to the west of the main ore zones. Similar quartz magnetite veins have been observed at Great Cobar and are interpreted to be early (pre gold). This style of alteration is not associated with gold mineralisation.

An iron rich stilpnomelane occurs predominantly at New Occidental (Bell et.al. 2000) and to a lesser extent at New Cobar and Chesney. At New Occidental, the occurrence of this mineral increases with depth. In addition to the strong Au-Bi correlation is a Cu-Ag relationship. This relationship is also seen within the Group 3 deposits discussed below. Fibrous and sometimes coxcomb textures are observed associated with stilpnomelane alteration.

The Great Chesney Fault (GCF) hosts the New Occidental deposit. It is the only one in the field. The main Chesney and New Cobar ore zones occur some 20 to 50m respectively west of the GCF and are hosted entirely within Great Cobar Slate (DNG). A relatively minor ore lens known as the Chesney Eastern Gold Lode is hosted by the GCF and exhibits similar characteristics to that of New Occidental.

Group 3

The northern most group is comprised of Gladstone and Great Cobar. These deposits occur some 400 to 900m respectively west of the GCF. They are hosted by siltstones and poorly bedded sandstones of the Great Cobar Slate (DNG). The sandstone units, while difficult to map, appear to play a controlling part in localising the mineralisation. The deposits are characterised by pervasive iron chlorite alteration and dark green magnesium chlorite alteration proximal to the mineralisation as in Group 2.

At Gladstone, the ore consists predominantly of chalcopyrite and minor pyrrhotite. The Gladstone mineralisation is characterised by quartz breccia veins and chalcopyrite. Great Cobar has more complex ore styles.

At Great Cobar, copper mineralisation occurs within a wide halo, up 100 metres. An historic, circa 1958 drill hole, CM1, intersected 45m @ 1.37% Cu, true width, from 1274m down hole and 36m @ 1.17% Cu true width from 1322.7m down hole. There have been at least 4 lenses identified at Great Cobar. These are lower grade eastern lens, the central lens (historically mined), a lead zinc lens occurring to the west and a lens to the north.

Early silicification, like the remainder of the Cobar field, is accompanied by iron chlorite alteration. Extensional textured quartz veins have intergrowths of stilpnomelane, biotite and chlorite. These textures are indicative of syntectonic metamorphic conditions (Ashley, 2004). Paragenetic relationships suggest that pyrite is early which has been partially replaced by magnetite, chalcopyrite, pyrrhotite and sphalerite (Ashley, 2004). The New Cobar style coliform-banded quartz-magnetite veins are not present at Great Cobar.

Great Cobar contains massive sulphide lenses. Porphyroblastic textures are commonly seen in the massive sulphides resulting from recrystallisation. Pyrrhotite, chalcopyrite and sphalerite are paragenetically later than pyrite and magnetite. The sulphides are partly intergrown in apparent equilibrium with chlorite, quartz, albite, stilpnomelane and biotite. The

best recent intercept is 17.6m @ 0.63g/t Au, 4.45% Cu, 0.03% Pb, 0.12% Zn, 19.3 g/t Ag from 645m down hole, true width.

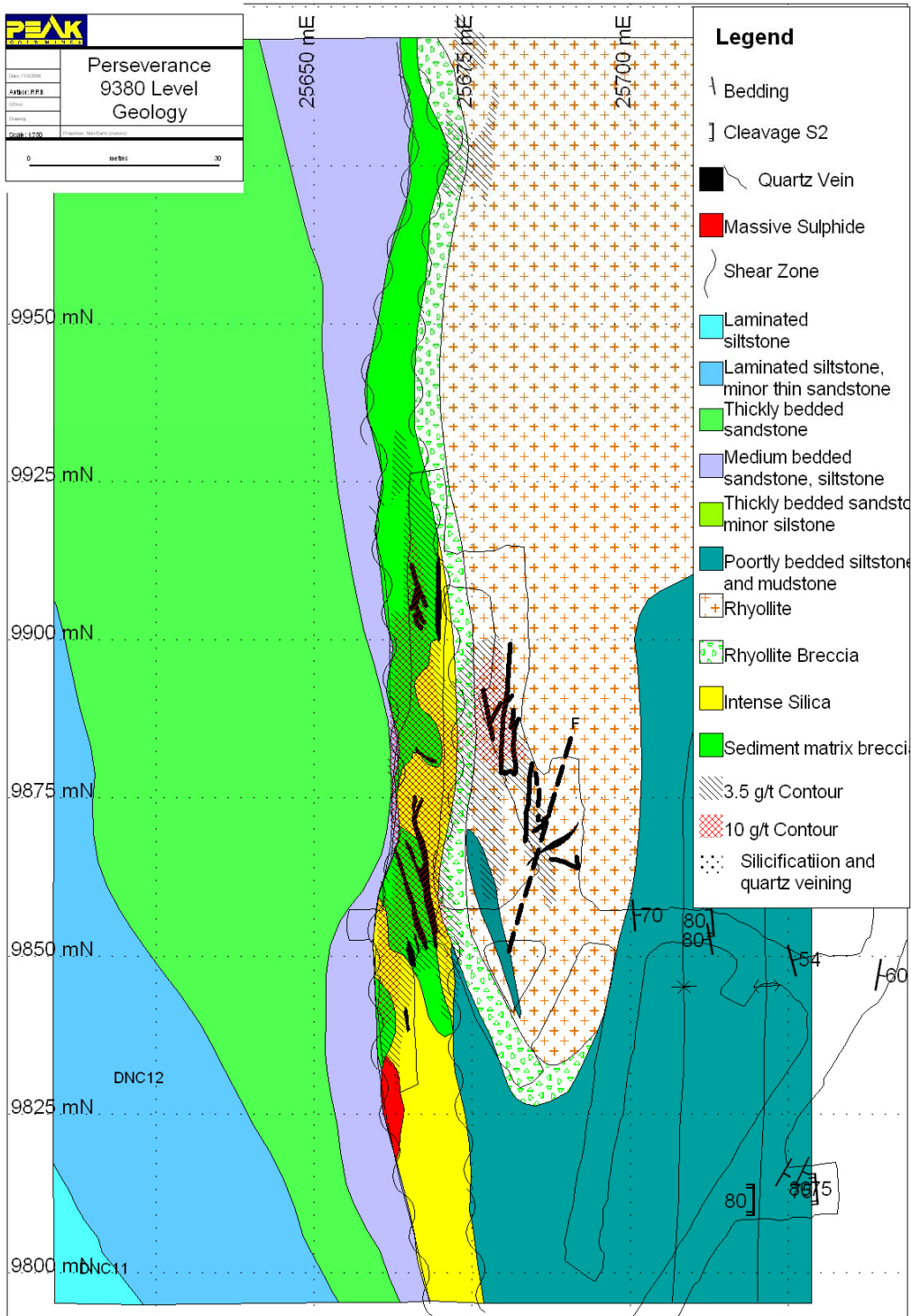


Figure 4 - Perseverance 9380 level Geology

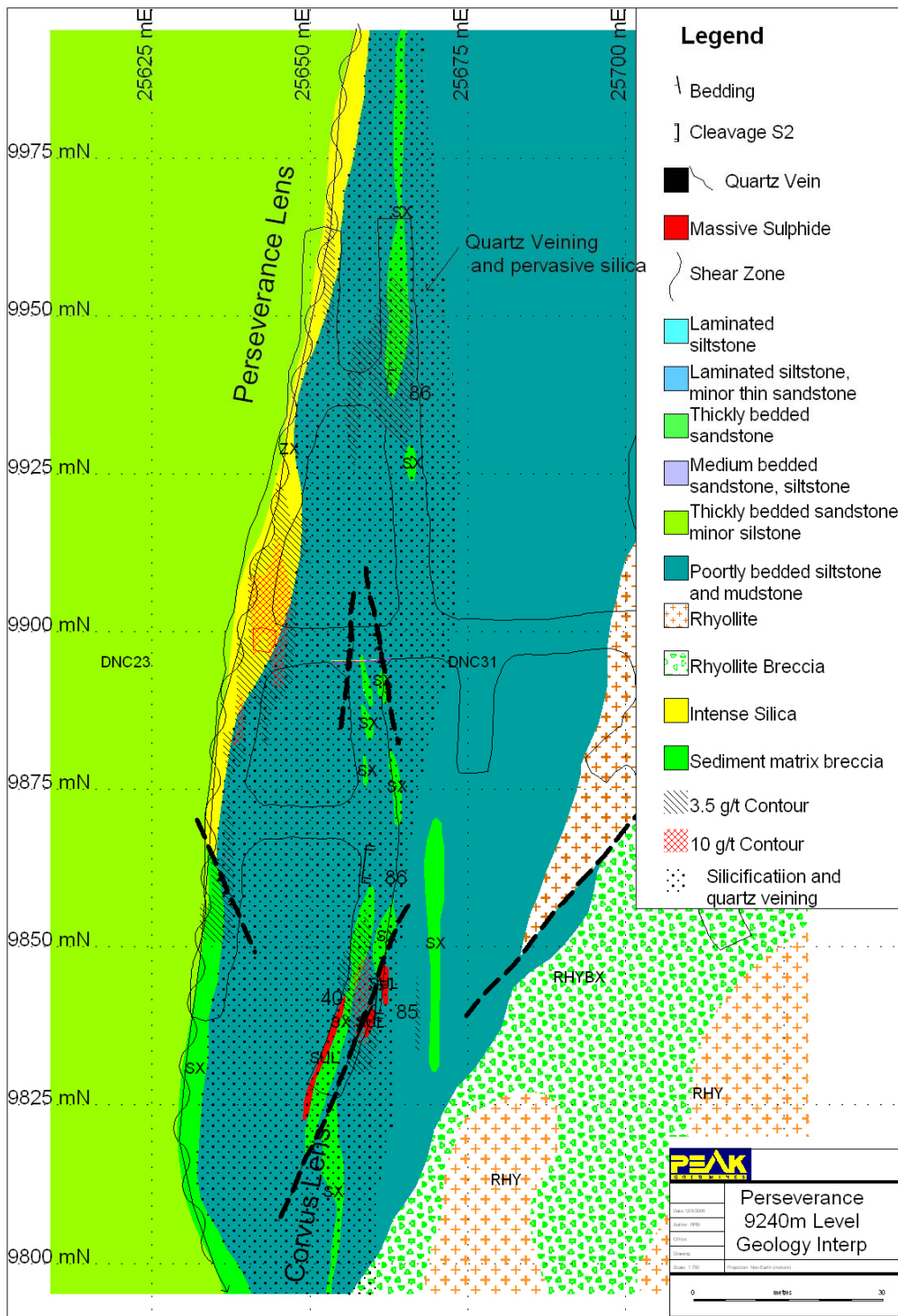


Figure 5 - Perseverance 9240 Level Geology

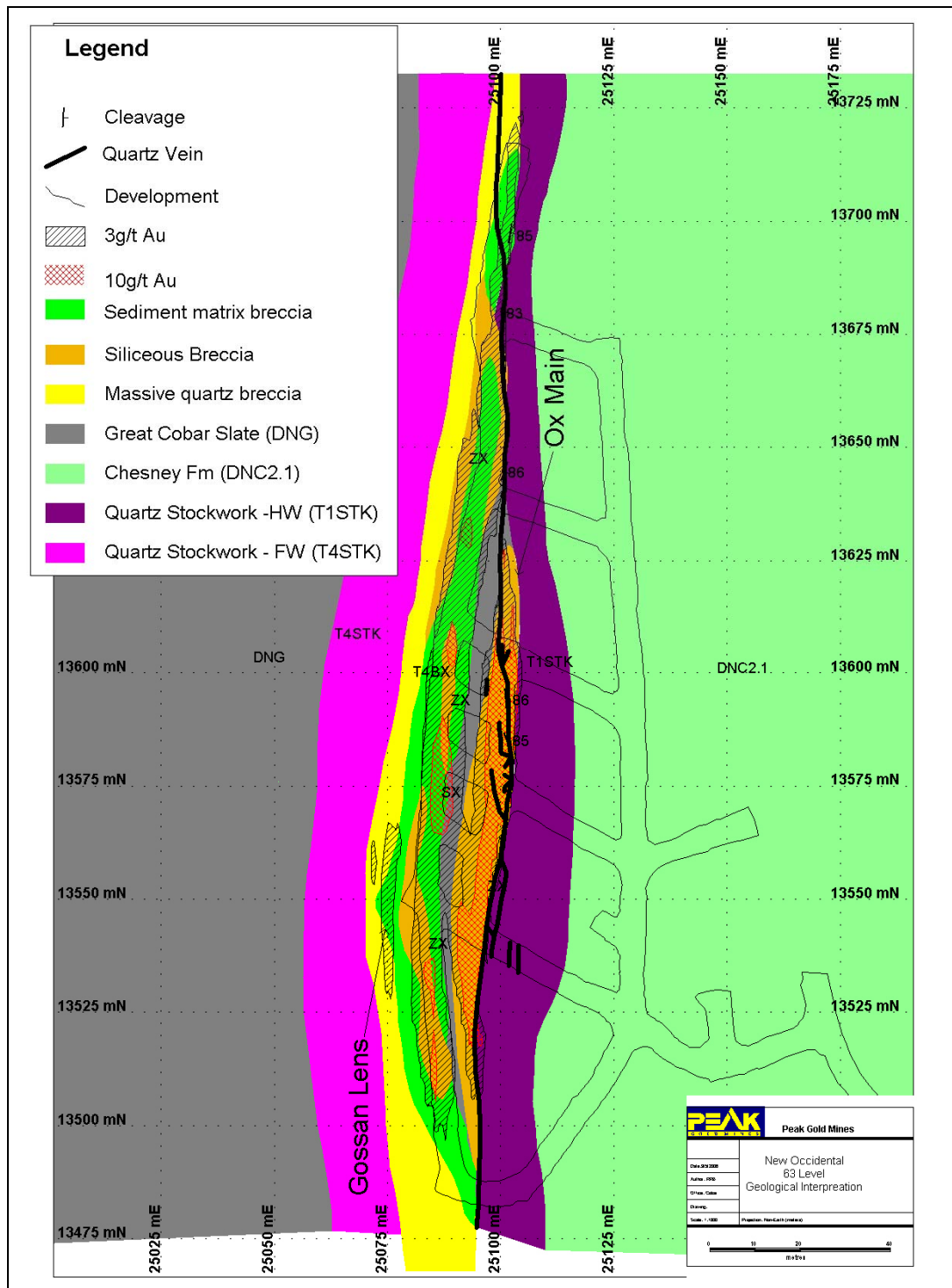


Figure 6 - New Occidental Plan at 63 Level (9690mRL)

Conclusions

There are three groups of ore deposits in the Cobar Gold field. They have characteristic ore styles, hosts rocks and mineral assemblages.

All deposits in the field have steep northerly plunges and are controlled by bends in faults and the juxtaposing of more competent rocks against less competent ones in faults and shears.

All of the deposits have grossly arcuate shapes to the ore lenses.

The Peak and Perseverance ore deposits, Group 1, are characterised by the presence of rhyolite as a host lithology. They have a complex history of ore deposition. They contain elevated levels of Cu (0.5-2%), Pb (0.1-1%), Zn (0.05 – 1%), Ag (10-12g/t) and Bi (50-

100ppm). Gold distribution tends to be more erratic with typical short strike length shoots within the broader mineralised envelopes.

The New Occidental, Chesney and New Cobar deposits are all hosted by or spatially related to the Great Chesney Fault and hosted by Great Cobar Slate. The early gold mineralisation is related to intense cryptocrystalline-chalcedonic silica veins. Bismuth mineralisation is regarded as coeval to this style of mineralisation. A later quartz breccia with associated copper mineralisation has strongly overprinted both Chesney and New Cobar, but to a lesser extent, New Occidental which contains a minor lens to the west known as Gossan Lens. Coliform-banded quartz – magnetite veins overprint the earlier gold mineralisation at New Cobar and to a minor extent, Chesney. These veins are also present at New Occidental in very restricted localities.

Stilpnomelane alteration has been observed with a later overprinting fibrous and sometimes coxcomb textured quartz veins. The textures indicate the quartz and stilpnomelane are syntectonic.

Copper rich and gold poor deposits of Group 3 include Gladstone and Great Cobar. Copper and silver have a strong correlation. The deposits are Great Cobar Slate hosted.

Acknowledgments

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