THE TRITTON COPPER MINE, NEW SOUTH WALES: NEW UNDERSTANDING OF THE DEPOSIT AND ITS POTENTIAL FROM MINING OF THIS BLIND DISCOVERY

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Introduction

Tritton Resources Limited (Tritton) owns and operates the Tritton copper-gold-silver mine in central west New South Wales. The underground operation produces approximately 25,000 tonnes of copper, 7,000 ounces of gold and 100,000 ounces of silver per year.

Tritton was established in 2002 by its founding directors, Ian Culbert and Mick McMullen, specifically to acquire the Tritton mine assets from Straits Resources (Straits). In December 2003, Tritton successfully completed an initial public offering of its shares and was admitted to the Official List of the Australian Stock Exchange Limited. Straits retained a 27% interest in Tritton and in 2005 increased this to 58%. In May 2006 Straits made an offer to purchase the remaining shares in Tritton.

The Tritton assets comprise the central project, the Tritton Copper Mine and the surrounding exploration licenses which encompass most of the historical Girilambone mining district.

Construction of the plant and development of the mine commenced early in 2004 and the plant was commissioned in December 2004. The plant is a conventional jaw crusher, ball mill, SAG mill and flotation plant. It produces approximately 100,000 tonnes of concentrate per year at a grade of 25% Cu, 2g/t Au and 30g/t Ag.

The Tritton orebody was discovered in 1995 by the Straits/Nord Joint Venture. A SiroTEM survey over the historical Budgerygar and Bonnie Dundee copper-gold mines, 800m north of Tritton, indicated significant conductors beneath the shallow workings. The survey was extended to the south and a similar sized anomaly detected over the now known Tritton deposit.

The top of the Tritton deposit is approximately 180m below surface and early holes tested above this and failed to intersect significant mineralisation. Down hole EM was used routinely and off hole anomalies were recognized. Drilling of these anomalies intersected the Tritton orebody.

Geology

The Tritton ore body is hosted in Ordovician age metamorphosed quartz sandstones (quartzites) and metapelites (mica schists) of the Girilambone Group. The mineralisation consists of two zones, the upper (UOZ) and lower ore zone (LOZ), each approximately 400m long, which strike at 028°T, dip to the east at 20 to 70° and pitch towards 130°T.

The UOZ is not weathered and is hosted within quartzite and minor schist. The ore body varies from massive banded pyrite and chalcopyrite to bands of sulphide laminated with silicified schist. The UOZ contains the highest chalcopyrite:pyrite ratios, the highest gold and silver values, minor bornite and tennantite and more numerous lenses of hematite+magnetite+silica alteration.

The LOZ occurs as massive and banded pyrite+chalcopyrite lenses in chloritic semipelitic schist, immediately overlying carbonate+epidote+magnetite altered mafic schist(Fogarty, 1998). Narrow, sub-vertical mafic dykes cut the orebody.

The host rocks to the Tritton ore are metamorphosed to greenschist facies. At least four major deformation events are recognized (A. Ham and O. Holm, SRK Consulting, 2005, internal report). The first three deformation events were important in developing the pre-mineralisation architecture that was critical for controlling the internal geometry of the ore deposit. The last major deformation event was critical for controlling the overall geometry and the location of the ore deposit and initiating the faults that were synchronous with the mineralisation.

The Tritton ore body is controlled by both fault and fold structures. Deposit scale controls include domains defined by major (district scale) steeply dipping northwest trending faults. These faults are responsible for the overall NW-SE trend of the deposit. The overall south east plunge of the ore body is controlled by the east to east southeast dip of bedding and a bedding parallel fault which lies between the north west striking faults.

Recent surface mapping has indicated that the Tritton orebody is part of a much larger system with dimensions of several square kilometres. The Tritton ore body is hosted within a north east trending, south east dipping, bedding parallel structure - the Tritton lode which has no apparent surface expression. However two sub parallel structures have been mapped on surface - the Budgerygar and Bonnie Dundee lodes. These lodes have strike lengths in excess of 800m, and each has been the focus of intense silica-sericite alteration. Sulphide mineralisation is found along the entire length of these structures but is concentrated in high grade shoots.

The mineralisation is anomalous (maximum values within the ore zone as defined by the 2.5% Cu cutoff) in Cu (32%), Au (9.9g/t), Ag (470ppm), Zn (2.3%), Pb (1400ppm), Ni (110ppm), Co (1755ppm), Sb (3.2%), As (1700ppm) and Bi (27ppm). In addition analysis of the Tritton Assay Standard, composited from ore on the 5085 to 5010 levels returned elevated trace elements including Hg (6.5ppm), In (6.23ppm), Se (157ppm), Sn (35ppm), Cd (181ppm) and Tl (5ppm).

Mine Geology

The deposit was drilled by Straits/Nord during the nineties at a density of approximately 40m by 40m in the UOZ and out to at least 80m by 80m in the LOZ. A resource of 14Mt at 2.7% Cu, 0.3g/t Au and 12g/t Ag (at a 1% Cu cutoff) was outlined based on 80,000m of drilling in 241 drill holes. The resource was defined as a regular, tabular, easterly dipping sulphide zone separated into a distinct upper (UOZ) and lower ore zone (LOZ). A conventional mining approach was anticipated that utilized a footwall decline and long hole stoping methods.

Mining and grade control drilling ahead of advance has shown the ore body to be much more irregular with considerable variations in thickness, strike length, dip and grade distribution. Rather than a regular dipping zone, the ore body is strongly folded on a scale of tens of metres. The ore body can vary in dip from sub-vertical to flat lying with sections of west dipping ore on the western limbs of folds.

The result is a heavier than expected reliance on grade control drilling to define stopes accurately. Each level needs to be drilled out on a nominal 15m by 15m spacing. The added complexity of the ore body has also called for innovative engineering designs on each level. Often long hole, room and pillar and slot mining is required on a single level.

Alteration and Mineralisation

The host metasediments have under gone an initial stage of replacement style alteration that is zoned from proximal (to main fluid channels) laterally outward to more distal settings as quartz+magnetite+carbonate →stipnomelane+quartz+biotite±magnetite → Fe-chlorite+carbonate±biotite±quartz±sulphides. These zoned replacement assemblages are syn-deformation but are mainly post formation of metamorphic quartz±albite veins. The quartz+magnetite+carbonate assemblage may be restricted to shallow levels in the UOZ.

A subsequent series of open space or depositional events in dilatant fractures and local breccias exhibit the following sequence of events (T. Leach, 2005, internal report).

(a) Hematite+Fe-chlorite at very shallow levels.

(b) Fe-sulphide+quartz+Mg-chlorite. The Fe-sulphide minerals are zoned pyrrhotite+pyrite → pyrite → pyrite+arsenopyrite/arsenean pyrite at progressively shallow levels. The quartz grades from strained to ribbon clear and unstrained in progressively later events indicating a change from compressional to extensional regimes during the mineralisation events. Pyrite at very shallow levels exhibits botryoidal colloform banded texture indicative of very rapid cooling conditions.

(c) Base metal sulphides+carbonates. The copper sulphides are zoned chalcopyrite → chalcopyrite+bornite → tennantite+chalcopyrite at progressively shallow levels. Sphalerite and galena are associated with copper mineralisation in the late stages of the base metal event and in settings distal from major structures. The sphalerite is zoned Fe-rich from deeper to shallower levels. Galena abundance increases at progressively shallow levels.

Gold mineralisation took place during the late stages of the base metal event. Native gold occurs as minute (2-15μm) inclusions in tennantite, whereas silver rich electrum inclusions occur in late stage galena+sphalerite+chalcopyrite+pyrite veins.

The carbonates grade from ankerite to Fe/Mn rich carbonates (siderite, Mn-siderite and rhodocroisite) at progressively shallower and later stages of the base metal event.

(d) Siderite±pyrite/chalcopyrite veinlets cross cut all other assemblages and extent for tens of metres into the wallrock schist and quartzite units.

Genesis

Spatial and temporal zonations in alteration and mineralisation indicate that hot (>250-300°C) mineralized fluids were channeled into significantly cooler conditions (especially at very shallow levels in the orebody) during a change from compressional to extensional regimes. The cooling of the mineralized fluid resulted in base and precious metal mineralisation. The overall change from quartz+oxide (magnetite → hematite), to sulphide minerals (pyrite/pyrrhotite → copper sulphides → lead+zinc sulphides), to late stage carbonate deposition is closely comparable to that documented in intrusion related copper-gold systems throughout the south west Pacific (e.g. Corbett and Leach 1998).

The sequence of events in the Tritton deposit is closely comparable to that described from a number of deposits in the Cobar area (Stegman, 2001). A magmatic component to the mineralisation has been previously precluded for the Cobar deposits based on differences in age dates between intrusions in the region versus deformation and mineralisation events, and on isotopic evidence. However, the many similarities in alteration and mineralisation between intrusion related deposits and the Tritton deposit, the high selenium and Se:Te ratios and the close proximity to syn-deformation granite intrusions make a felsic-intrusion source to the mineralisation at Tritton compelling.

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