Townsville Cu-Au prospect, Ok Tedi district, Papua New Guinea: A breccia system zoned from Cu-Au-Ag skarn to quartz-carbonate-base metals-gold

P.J. Pollard[1], R. Jongens[2], R. Smillie[3], M. Mollomb[4], M. Erceg[5], P. Olubas[6]

1. Director, Pollard Geological Services Pty. Ltd., The Gap, Queensland 4061. peter@peterpollard.com
2. Director, Anatoki Geoscience Limited, Dunedin, New Zealand. richard.jongens@gmail.com
3. Head of Department, Regional Geology, GNS, Dunedin, New Zealand. rob_smillie@mail.com
4. Ok Tedi Mining Limited, Tabubil, Western Province, Papua New Guinea. Majella.Mollomb@oktedi.com
5. Consulting Exploration Geologist, North Lakes, Queensland 4509. michael.erceg1@bigpond.com
6. Geology and Exploration Manager, Ok Tedi Mining Limited, Tabubil, Western Province, Papua New Guinea. Peter.Olubas@oktedi.com

ABSTRACT

The Townsville prospect is situated 4 km north-northeast of the Ok Tedi mine, Papua New Guinea. Cu-Au mineralization is hosted in several breccia bodies extending vertically for more than 800 metres within Pnyang Formation siltstone-sandstone and underlying Darai Limestone. The deposit occurs within a broad WNW-trending synclinal hinge zone between the ca.1-2 Ma Ok Tedi and Mt Ian intrusive complexes. The breccia bodies appear to be controlled by the intersection of major NNE- and WNW-oriented faults, but in places also follow gently dipping bedding.

Alteration and mineralization is divided into three stages, which from early to late include:

1. Calc-potassic alteration consisting of clinopyroxene ± actinolite ± epidote ± chlorite ± carbonate ± pyrrhotite alteration of calcareous sandstone layers and K-feldspar alteration of siltstone layers.

2. Early skarn which is zoned from deeper brown garnet skarn after limestone to shallower clinopyroxene-epidote skarn after siltstone-sandstone.

3. Skarn breccia composed of K-feldspar ± epidote-altered angular to rounded fragments of host rocks and earlier alteration together with hydrothermal infill which is strongly zoned. From deeper to shallower levels infill comprises: anhydrous skarn, hydrous skarn, quartz-carbonate-base metals-gold and milled breccia with clay-sericite matrix and alteration.

Cu-Au mineralization occurs mainly in the anhydrous skarn while Au-Ag mineralization occurs in the hydrous skarn and overlying quartz-carbonate-base metals-gold zone. There is commonly a 100+ metre interval of very low-grade skarn breccia between the mineralized zones.

The upper part of Townsville is similar to the carbonate-base metal-gold deposits described by Corbett and Leach (1998) that include Kelian (Indonesia), Porgera and Misima (Papua New Guinea), and Acupan (Philippines). Zoning of Townsville gold mineralization downwards into weakly mineralized skarn breccia and then deeper Cu-Au mineralization indicates the possibility

that deposits of this type may overlie as yet undiscovered porphyry and/or skarn Cu-Au mineralization.