Immobile Element Geochemistry of Altered Volcanics and Exhalites at the Thalanga Deposit, North Queensland

by:

Walter Herrmann B.Sc.(Hons.)
c/- PO Box 873 Charters Towers QLD 4820

Submitted in fulfilment of the requirements
for the degree of M.Econ.Geol.
University of Tasmania

December, 1994.

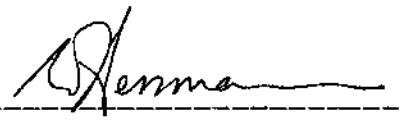
ABSTRACT

Thalanga is a deformed and metamorphosed volcanic hosted massive sulphide deposit consisting of several thin, stratiform semi-connected lenses located at a sub-vertically dipping contact between rhyolite and dacite formations. Rocks composed of quartz-magnetite-barite and chlorite-tremolite-carbonate, which have previously been interpreted to be exhalites, exist in intimate stratabound association with sulphides, particularly in the western lenses. Rhyolites stratigraphically beneath the deposit are extensively hydrothermally altered with a stratabound stringer zone of intense silicification containing 4-20% pyrite in the immediate footwall of the sulphide lenses, grading outwards and downwards through progressively weaker zones of quartz-chlorite-sericite and quartz-sericite alteration.

Titanium, aluminium and zirconium remained chemically immobile during alteration, and subsequent metamorphism. These immobile elements permit identification of the volcanic precursors of altered rocks and quantitative estimation of the chemical changes due to alteration. Large gains of silica, iron, sulphur and loss of sodium are indicated for the zone of most intense footwall alteration.
Chlorite-tremolite-carbonate rocks associated with sulphides have immobile element contents and ratios identical to those of altered footwall rhyolites and their chemistry is consistent with a derivation from rhyolite involving large gains of calcium, magnesium, CO_2 and losses of silica and sodium. They are re-interpreted to be metamorphosed chlorite-carbonate alteration assemblages which probably formed in permeable rhyolitic volcaniclastics by hydrothermal fluid and sea water mixing at the upper and outer parts of a mineralising sub-marine hydrothermal system.
Magnetite-quartzites have very low immobile element contents and may be the only true exhalites at Thalanga, other than massive barite and base metal sulphide assemblages.

Declaration

This thesis contains no material which has been accepted for the award, to me, of any other higher degree or graduate diploma in any tertiary institution. To the best of my knowledge and belief this thesis contains no material previously published or written by another person except when due reference is made in the text of the thesis.



1/12/94

Walter Herrmann

ACKNOWLEDGEMENTS

The Managers of Pancontinental Resources (Base Metals) Pty Ltd are acknowledged for providing the opportunity to study the Thalanga deposit and funding for chemical analyses and petrographic sections.

It is my pleasure to sincerely thank all the following people for their contributions to the work.
A great deal of knowledge and helpful, stimulating discussion was volunteered by Pancon geologists Andrew Blair, Haydn Hadlow, Anthea Hill, Mel Jones, Colin Kendall, Ian Levy, Rodney Sainty and Ian Warland.
Kim Burleigh, Krista Davies and Harold Webber cheerfully provided invaluable technical assistance in drillcore handling and sampling. Robin Voss expedited colour photocopying of photographic figures.
Ron Berry, Bruce Gemmell, Ross Large and Joe Stolz, of the University of Tasmania - Centre for Ore Deposit and Exploration Studies, are acknowledged for their guidance and interest in the project.
Not least, the encouragement and forbearance of Danielle, Alina and Eva Herrmann is greatly appreciated.

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