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A PROGRESS REPORT ON THE STRATIGRAPHY AND CONTROLS ON MINERALIZATION AT THE CLISBAKO PROPERTY

by

STEVEN J. BLOWER

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INTRODUCTION

As part of a Master's degree program at Queen's University I have evaluated the Clisbako property stratigraphy and attempted to identify the controls on mineralization. This report is a summary of the project and is intended for Minnova exploration personnel. It is an abbreviated version of a formal submittal to Queen's which has yet to be written.

WORK PERFORMED

Nine days were spent mapping the property at a scale of 1:2500. A flagged grid established by Minnova in 1991 was used for control. Outcrops and data were plotted onto 8.5" x 11" field sheets and then transferred onto a large 1:2500 scale map for interpretation. This map was then transposed onto a 1:5000 scale base for a comparison with previous mapping efforts.

Following this, three days were spent evaluating diamond drill core from the 1991 drilling program. Holes 91-1,2,3,4,5,6,13,14,16,17 and 19 were selected as containing pertinent information and were re-logged for their lithologies and contact relationships.

GEOLOGICAL INTERPRETATION

The Clisbako property is underlain by two distinctly different packages of rock (Packages A and B) that are separated by an unconformable contact. Post (?) mineralization faults have locally juxtaposed the two groups (figure #1).

Package B

Package B is the older of the two and occupies the western and south-central portions of the property. This assemblage is composed of interbedded aphyric ash tuffs, minor feldspar-phyric rhyolite flows, and voluminous feldspar quartz crystal tuffs and amygdaloidal andesites.

Bedding in the tuffs and contact/topography relationships indicate that the units within package B all have a roughly north-south strike and dip 50-90 deg. to the west. Primary features in the andesites (flow top breccias and vesicle/amygdule concentrations indicate that the units are right-way-up. Many of the units within this package thicken toward the south, particularly the feldspar quartz crystal tuff.

Package A

This package is a heterogeneous mixture of rhyolite flows and pyroclastics. The flows are characterized by common autoclastic breccias, flow banding, perlitic textures and occasional spheroidal textures. The latter may be related to magma mixing, gaseous phase alteration or devitrification (Thompson, pers. comm.). Complex contact relationships within the package reflect rapid lateral and vertical facies changes within the volcanic pile. This results in a lack of correlation of units between drill holes, trenches and outcrops.

The orientation of the units within Package A is unclear as bedding measurements are very inconsistent. Overall, the package is roughly flat lying.

The Nature Of The Contact Between Packages A and B

Direct evidence for an unconformity separating Package A from Package B is present in drill holes 91-1 and 91-6. A heterolithic breccia consisting of alluvial gravel clasts incorporated into the base of overlying rhyolite flows (Package A) rests on top of feldspar-quartz crystal tuff of Package B.

The nature of the contact between packages A and B at the South Zone is unclear. Diamond drilling indicates a moderate dip to the west, with some fault movement along the contact. If this structure is truly a fault, then the net displacement is reverse - which is difficult to explain.

MINERALIZATION

Although it was not my mandate to study the styles of mineralization in detail, some observations are worth noting.

Two distinct styles of mineralization have been observed on the property and they seem to be related to their host lithology.

The first style is characterized by the Gore and Pond Zones. Each consists of 1-2 meter wide quartz and quartz breccia veins with minor quartz stockworks developed in the adjacent wall rock. Both of these are hosted by Package B andesites. The hydrothermal solutions giving rise to these veins were lithologically controlled and relatively constrained - as evidenced by the narrow alteration zones accompanying these structures. Fault movement along lithological contacts may have contributed to the localization of hydrothermal fluids.

The second type of mineralization occurs in the North Zone and is hosted primarily by rhyolites of package A. Here, high level chalcedonic quartz veins and breccias are accompanied by very wide quartz stockworks and argillic and siliceous alteration zones.

It is probable that the differences in styles of mineralization can be related to their host lithology (and stratigraphic position). Narrow, constrained veins and alteration zones occur within Package B and wide, diffuse, higher level stockworks dominate in Package A.

The South Zone mineralization, while hosted in andesite of package B, is accompanied by an alteration zone and quartz stringer stockwork similar to rhyolite-hosted zones. This may indicate that an overlying rhyolite was not far above the South Zone trenches at the time of mineralization and has since been eroded.

IMPLICATIONS FOR EXPLORATION

The constrained nature of mineralization and alteration associated with zones hosted by package B indicates that these hydrothermal solutions were not drastically out of equilibrium with the surrounding lithologies at this stratigraphic level. Pressures were lithostatic and it is possible that any gold in the system was content to remain in solution at this level.

The unconformity above may be a suitable location for gold deposition. A change in alteration and vein style has been noted

above the unconformity - indicating that the overlying rhyolites provided a structurally and chemically distinct unit through which the hydrothermal solutions would have to pass. It is possible that large quartz breccias and veins may be mineralized directly above this unconformity.

Two exploration approaches may be useful. Veins present in package B should be projected beneath the unconformity and tested immediately above the rhyolite contact (especially beneath IP/RES anomalies). Also, veins located at surface within Package A should be followed down-dip to the unconformity.

The first approach has inadvertently been done at the West Lake Zone. This Package A set of veins is along strike of the Pond Zone veins which are hosted in Package B. The structures at the West Lake Zone should be tested at depth near the unconformity.

This model for mineralization suggests that those areas underlain by rhyolites are more prospective than those underlain by rocks of Package B. Therefore the area to the north of the West Lake and North Zones is promising.