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# EPITHERMAL PRECIOUS METAL MINERALIZATION IN THE OOTSA LAKE GROUP, WOLF PROSPECT, CENTRAL BRITISH COLUMBIA

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Epithermal precious metal mineralization in Eocene Ootsa Lake Group rhyolite is documented at the Wolf prospect, central British Columbia. Despite potential for significant epithermal mineralization, detailed geologic mapping and exploration of the Ootsa Lake Group on the Nechako plateau has been hindered by extensive overburden and costly limited access. Logging activity in recent years has enabled construction of new roads which have opened up the area considerably.

The Ootsa Lake Group unconformably overlies Lower and Middle Jurassic rocks of the Hazelton Group. In the Wolf area it comprises calc-alkaline rhyolite tuffs and flows intruded by felsic stocks and dykes (Fig. 1). These intrusive and extrusive rocks are cogenetic, representing a single magma series, and their observed chemical diversity could be the result of feldspar differentiation. They are dated by whole rock K-Ar as mid-Eocene (47.6 to 49.9 ± 1.7 Ma). A caldera collapse setting is suggested for these explosively erupted tuffs, flows and subvolcanic porphyries. Poorly consolidated epiclastic rocks with a mid-Miocene (13.5 to 17 Ma) palynomorph assemblage occur beneath Ootsa Lake Group rhyolite at Wolf. It is suggested that the older Ootsa Lake Group has been thrust over the mid-Miocene assemblage.

2 new ones @ 18 Ma

At the Wolf prospect, precious metal minerals occur in bladed quartz-carbonate veins and heterolithic breccias within rhyolite of the Ootsa Lake Group. Metallic minerals include electrum, native silver and silver sulphosalts occuring as inclusions in and adjacent to pyrite. The veins and breccias comprise five silicic zones bordered by argillic and sericitic altered rhyolite.

'boiled'

Fluid inclusions define growth zones in precious-metal bearing quartz-carbonate veins and precious-metal poor late drusy quartz veins. These primary fluid inclusions are typically two-phase and liquid-rich with low salinities and low $CO_2$ contents. Heating studies of quartz-carbonate veins indicate two distinct fluid inclusion homogenization temperatures, 270° C and 170° C. Fluid inclusions from the drusy quartz veins homogenize at 250° C.

Oxygen isotope compositions of vein quartz, rhyolite and alkali feldspar phenocrysts are depleted in $^{18}O$ by 4 to 9 ‰. These $^{18}O$ depletions are caused by a high degree of isotopic exchange between rhyolite and large volumes of low $^{18}O$ content fluids at elevated temperatures. Oxygen and hydrogen isotope evidence indicates that hydrothermal solutions at Wolf were meteoric in origin with virtually no contribution from magmatic sources.

Post mid-Eocene block faulting and earlier structures relating to collapse of the Wolf caldera provided conduits for circulating hydrothermal fluids and controlled the deposition of veins. Fluid inclusion homogenization temperatures show that fluids depositing the quartz-carbonate veins and associated mineralization were boiling and existed under two pressure regimes; hydrostatic and near lithostatic. Both conditions confirm epithermal depths of emplacement of about 100 m below paleosurface (Fig. 2). The fluids then evolved to a non-boiling, lower salinity, extremely $^{18}O$ depleted variety which precipitated late barren drusy quartz veins. Geological setting, vein and breccia textures, alteration, metal distribution and depositional fluid composition at Wolf resemble a low sulphur, hot spring or silicified stockwork deposit.

Selenium? — naumannite
aguilarite

Thallium?

Eg. BLACKDOME!

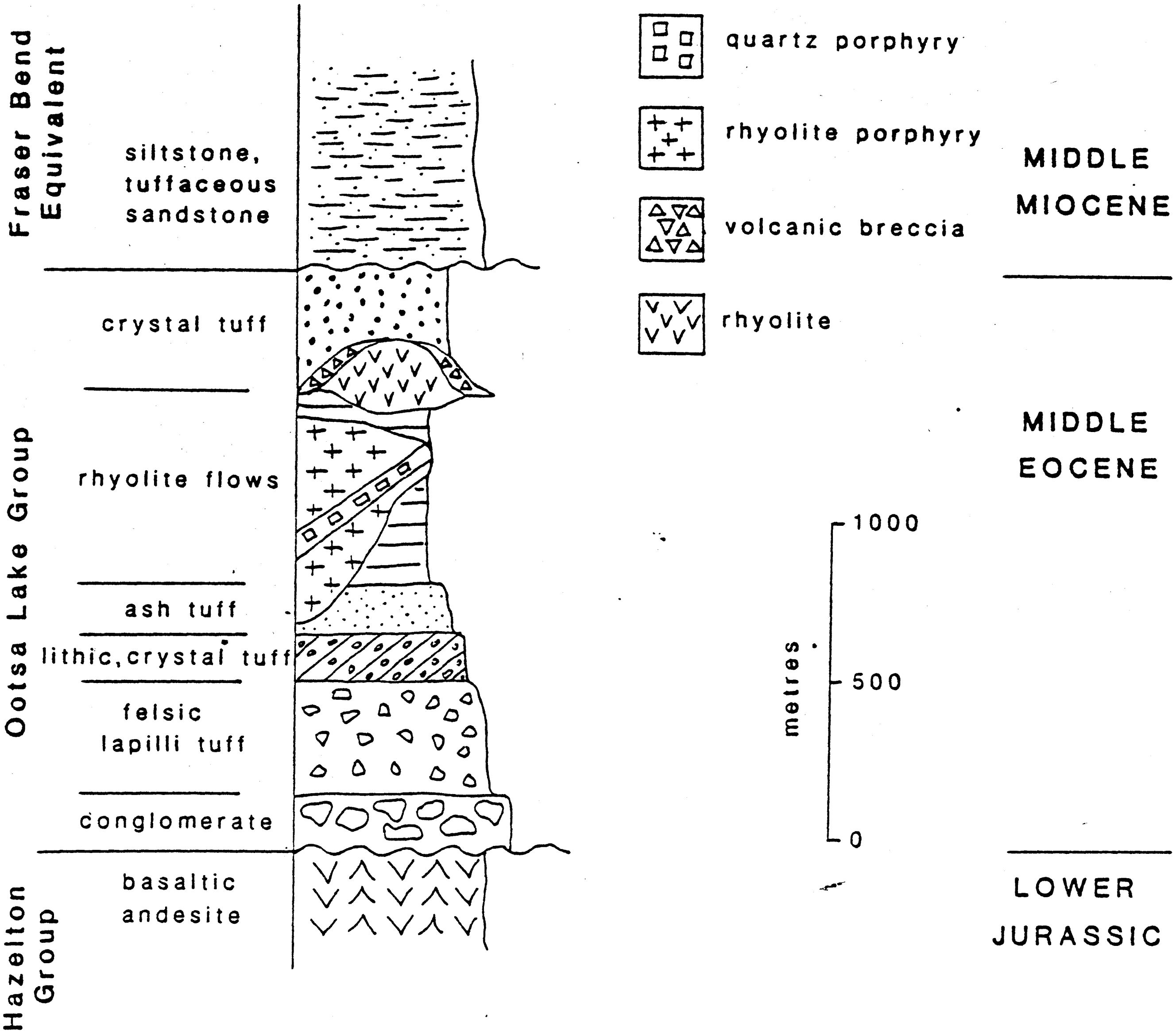


Figure 1. Composite volcanic succession, rhyolite member of the Ootsa Lake Group, Wolf prospect, central B.C.

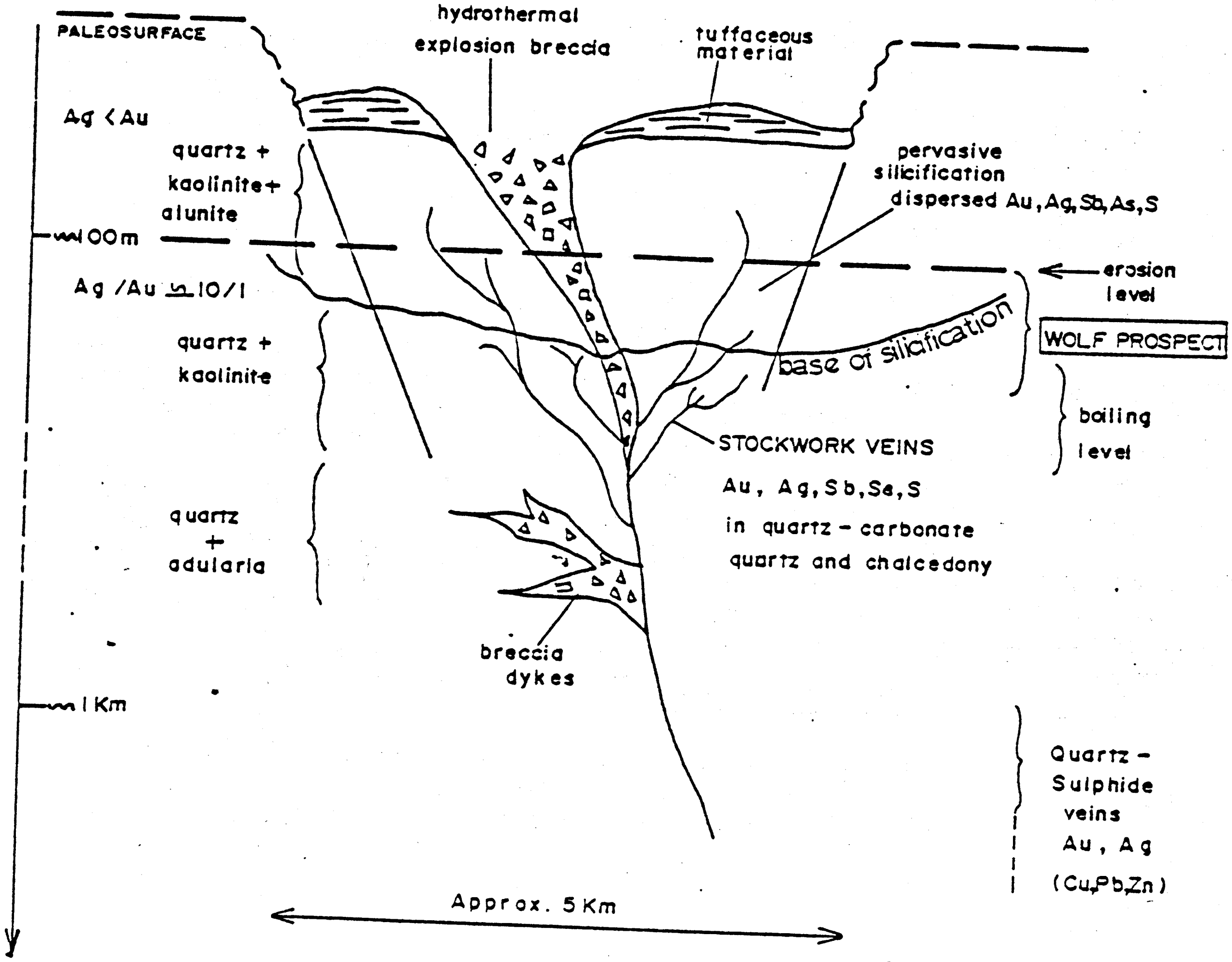


Figure 2. Schematic cross-section of low sulphur, hot-spring type silicified stockwork model for the Wolf prospect, central B.C.