

ALKALINE COPPER-GOLD PORPHYRIES: SCHIZOPHRENIC COUSINS OF REAL  
PORPHYRY COPPERS

P.E. Fox, April 5, 1989

Alkaline porphyry deposits comprise irregular mineralized zones of disseminated orthomagmatic copper (gold) lying within a potassium- and/or sodium-rich alteration halo that developed during a period of protracted hydrothermal activity of magmatic origin close to one or more multiphase, subvolcanic, magnetite-rich plutons of alkaline affinity (high K, Na, low SiO<sub>2</sub>).

Replacement lodes of gold (silver, base metal) deposits related to this process form in propylitically altered rocks external to a central zone of intense potassic (K-feldspar) alteration.

The alkalic centres are associated with tensional and strike-slip tectonics and were derived from mantle sources during a period of arc stabilization. Modifications of the mantle by previous arc-related subduction produced a variety of alkalic magmas that were quickly emplaced into subvolcanic centres.

Regional Setting

Subvolcanic, comagmatic alkaline volcanic rocks, regional alignment of intrusive centres.

Magmatic Components

Rapid emplacement, crystal fractionation and local re-emplacment of rest magmas progressively enriched in alkalis and depleted in iron. Rapid quenching and degassing of evolved magmas.

Results in : multiple intrusions, porphyritic textures, micro-porphyrries, zoned intrusions, intrusion breccias, intrusive breccias, magmatic sulphides (high Cu:Fe).

Hydrothermal Components

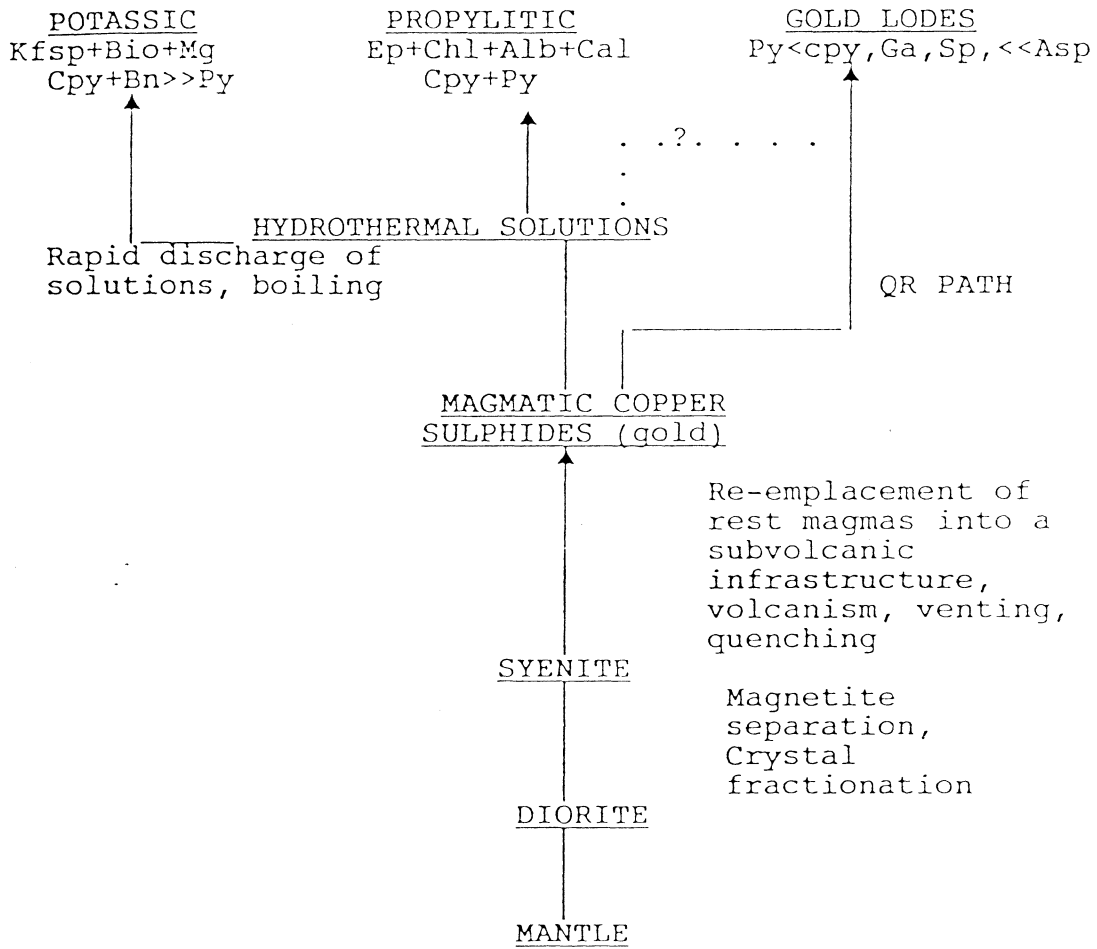
Rapid development of solutions rich in K, Na, Ca, <Mg, <Ti; moderate oxidation state and pH, low H<sub>2</sub>O:rock ratio, low S<sub>2</sub>, low SiO<sub>2</sub>, no meteoric component, no circulation cells. Numerous pulses from evolving magma sources and resurgent boiling common.

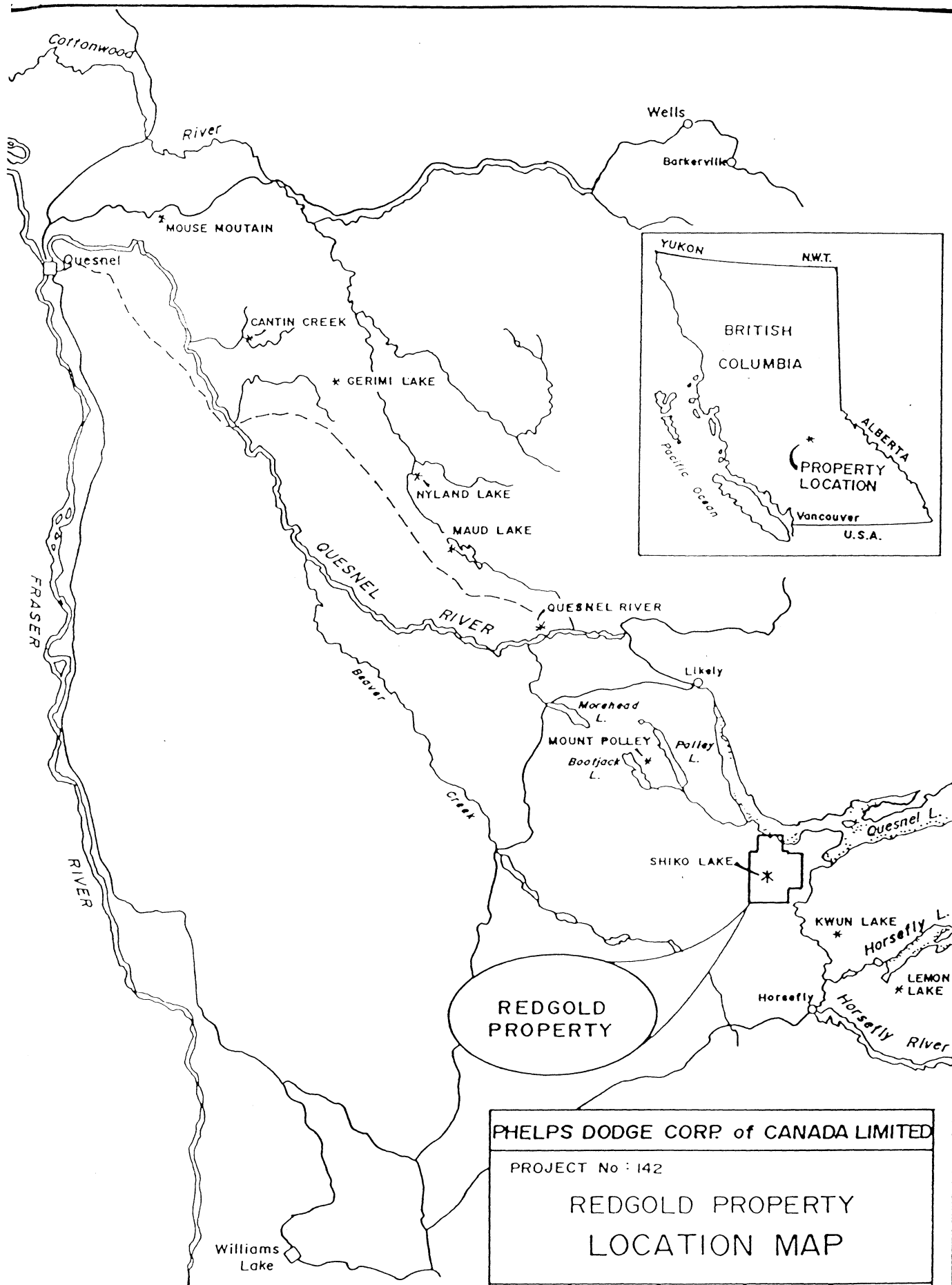
Results in: widespread K-feldspar+biotite+magnetite (potassic) and epidote+chlorite+calcite+albite (propylitic) assemblages, hydrothermal breccias and fractures zones, telescoping of mineral assemblages, disseminated ores >> than fracture related, and the absence of phyllic and H<sub>2</sub> metasomatism, quartz veins or stockworks, and consistent mineral zoning patterns.

Mineralization

High Cu:Fe copper sulphides (+/- accessory gold) are associated with syenitic porphyries, breccias, and zones of intense potassic (K-feldspar+Ti-biotite+magnetite) alteration. Gold replacement lodes occur peripheral to potassic zones.

SCHEMATIC EVOLUTION  
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REDGOLD  
PROPERTY

PHELPS DODGE CORP. of CANADA LIMITED

PROJECT No : 142

REDGOLD PROPERTY  
LOCATION MAP

SCALE	DATE	FILE	N.T.S. No.:	FIG. No.
1:500,000	21 NOV 89	142-009 BY: PKM RK	93A	1

KWUN LAKE  
\* ..... Alkalic stock