Fluid chemistry of the Phu Lon Cu-Au skarn deposit, Loei Fold Belt, northeastern Thailand: Implication for ore genesis

T. KAMVONG[1] K. ZAW[1] AND A. HARRIS[1]

[1] CODES Centre of Excellence in Ore Deposits, University of Tasmania, Australia ; tkamvong@utas.edu.au; Khin.Zaw@utas.edu.au; A.Harris@utas.edu.au

The Phu Lon skarn deposit is located in the northernmost portion of the Loei Fold Belt (LFB). The LFB is the Thailand's most extensive belt of calc-alkaline magmatism and Cu-Au mineralisation, related to the eastward subduction of the Shan-Thai Terrane beneath the Indochina Terrane. The deposit is hosted in Devonian volcano-sedimentary units and limestone and genetically associated with oxidised I-type intrusions. The aim of this study is to constrain the fluid chemistry responsible for the Cu-Au mineralisation and to interpret the evolution of mineralising fluid at Phu Lon.

The S isotopic composition of chalcopyrite, pyrite and sphalerite gives $\delta^{34}S$ values ranging from -2.6 ‰ to -1.1 ‰. These values are interpreted to represent the $\delta^{34}S$ values of common magma-derived fluids. Based on only limited observations, primary fluid inclusions from andraditic garnet associated with the prograde metasomatism yield T_h (T_h (LV→L)) from 425 to 468°C with estimated fluid salinities from 17.4 to 23.0 wt. % $NaCl_{equiv.}$. A single andraditic garnet from the retrograde stage provides 396 to 421°C T_h with a salinity of 19.6 wt. % $NaCl_{equiv.}$ for primary fluid inclusions.

At Phu Lon, a plot of salinity versus T_h does not define a continuous trend between the prograde and retrograde skarn, thus, and may suggest intermittent fluid flows of external fluids during the retrograde skarn formation at different times, possibly in response to hydrofracturing. We also compared the T_h and salinity information from the Phu Lon deposit with other Cu-Au skarn deposits and indicate that the maximum salinities of fluid inclusions in skarn at Phu Lon are slightly lower than those documented in other Cu-Au skarn deposits. This difference in fluid composition may reflect in the absence, at Phu Lon, of a complex overprinting of various calc-silicate and retrograde alteration stages, indicative of multiple intrusive phases and fluid pluses [1]. The $\delta^{34}S$ values from Phu Lon indicate that chalcopyrite tends to decrease progressively from the depth upwards. This changing of the $\delta^{34}S$ values could result from changing the physico-chemical conditions in the ore-bearing fluids as these fluid may have flowed away from the pluton and interacted progressively with the host rocks during the magmatic-hydrothermal processes.

References

[1] Franchini M.B., Meinert L.D. and Montenegro T.F. (2000) *Economic Geology* **95**, 1197-1213.