



### **Ph.D Project and Summer Job Opportunity**

#### **“Evolution of regional-scale metaliferous hydrothermal fluid flow systems: A multidisciplinary integration of paleogeography-tectonics, geochemistry & thermochronology to understand the genesis of, and exploration-potential for, red-bed Cu-deposits”**

**Supervisors:** Dr. Kenneth Hickey (Mineral Deposit Research Unit, University of British Columbia), Dr. Sarah Gleeson (University of Alberta)

Regional scale hydrothermal fluid flow is a fundamental crustal process responsible for many of the world’s large base (Cu, Pb, Zn) and precious metal (Au) ore deposits. Constraining the geological environment, spatio-temporal dimensions, relative fluid flux and physio-chemical(mineralogical) evolution of such hydrothermal systems and the rocks that host them is crucial for understanding ore-deposit genesis and for developing process-based models of ore genesis for use in mineral exploration. Identifying gradients in one or more of the physio-chemical(mineralogical) expressions of metaliferous fluid flow also provides an empirical means for developing distal vectors toward ore, a key element in the exploration for sub-surface mineral deposits.

The primary objectives of this PhD project are to; (i) improve our understanding of the hydrothermal systems responsible for sedimentary rock-hosted Cu-mineralization (“red-bed copper”) and how their physio-chemical evolution in time and space leads to economic concentrations of ore. (ii) Identify rock-based mineralogical/chemical vectors toward such concentrations of ore. The project will focus on the Redstone copper belt in the eastern Mackenzie Mountains of the NWT, Canada. Research will follow a multidisciplinary approach involving a large field component and will initially seek to define the basin architecture and tectonic-paleogeographic framework for mineralization. Field studies will be complemented by laboratory studies including petrographic texture analysis, whole rock litho-geochemistry, mineral chemistry, and radiogenic/stable isotopic and fluid inclusion studies to identify the source of the mineralizing fluids, metals and sulfur necessary to form the deposits. Data from zones of known mineralization will be compared to data collected in barren units to identify chemical tracers that may be used as vectors for mineralization. Finally, a combination of fluid inclusion thermometry, organic thermal maturation indicators and low temperature thermochronometers will be used to map the thermal expression of the hydrothermal system and help define more distal vectors toward ore.

Logistical support and funding for the project will be made available from Western Copper Corporation and the project will be carried out in the Mineral Deposit Research Unit at The University of British Columbia with stays at the University of Alberta. Any student interested in this project must qualify for admission to the Department of Earth and Ocean Sciences at UBC. Details for eligibility and the application procedure can be found at <http://www.eos.ubc.ca/academic/graduate/application.html>.

The Mackenzie Mountains offer some of the most spectacular scenery on the planet and the project requires a student that is willing to work in isolated and physically challenging terrains. A strong background in field geology, structural geology and sedimentology is desirable, as is an avid interest in understanding the evolution of metaliferous hydrothermal systems. The successful applicant will start in

time for a field season in summer 2009. As a means of supplementing the project stipend, there is a strong likelihood that regular summer work will be offered by the supporting company throughout the life of the project.

If you are interested please contact:

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