

# COMPOSITIONAL CHANGES IN THE ALTERATION U-ZN MASSIVE SULFIDE DEPOSIT

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pyroclastic lava and volcanoclastic unit forms  
below volcanogenic Cu-Zn massive sulfide  
line in the Matagami District in northwestern  
Ontario. The assemblages are: (1) quartz-  
sericite, (2) quartz-chlorite-sericite, (3)  
quartz-chlorite-talc-stilpnomelane, and (5)  
pyrite. Chlorites form a large solid solution  
substitution of Al for Si, and extensive  
substitution. Chlorites in assemblages (1) and (2) define  
the solid solution field, and chlorites  
define the boundary. Al substitution for Si  
in chlorite increases linearly with substitution  
in sites. The Al for Si substitution is  
calibrated, and when further calibrated may form

an early, mild alteration involving addition  
of pyroclastic. Assemblage (2) formed in a more  
intense alteration during which Ca and Na were leached and  
chlorites in assemblages (1) and (2) are  
replaced by Fe produced a two-phase system  
of compositions continuously shifting  
across the boundary. When this boundary is reached  
the assemblage is also stable (assemblage 4). Concurrent  
with the formation of (3) and (4) produces the  
assemblage (5). Ultimate mass and volume losses during  
alteration are 70%.

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Pyroclastic from fused whole rock powders and  
thin sections are readily obtained by ion  
beam analysis. The mode of kinetic energy  
calibration curves. A method of sample  
analysis removes matrix variation  
analysis requires calibration for each  
element. Calibration curves are constructed,  
obtained quickly and with accuracy

## THE PROGRADE METAMORPHISM OF PELITIC SCHISTS, QUEBEC.

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The Labrador Trough is characterized by a  
sequence in the greenschist to upper amphibolite  
facies. The assemblages are: garnet in, staurolite in, kyanite in,  
andalusite and muscovite out. Tourmaline is an  
important mineral in the pelitic schists. Grains are strongly zoned;  
the core is more altered than the rim. An electron-microprobe study

## EVIDENCE OF HIGHLY EVOLVED ORE FLUIDS RESPONSIBLE FOR SULFIDE ASSOCIATED GOLD MINERALIZATION IN THE BRIDGE RIVER DISTRICT, B.C.

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Several sulfide associated vein and replacement type gold deposits are  
present in the Bridge River District of southwest British Columbia. The  
deposits consist of mineralized shears, irregular replacement bodies  
and discrete veins striking obliquely across greenstones and sediments  
of the Middle Triassic Bridge River Group (Fergusson Group).

These deposits differ from the Bralorne-Pioneer gold deposits in  
that they carry abundant mixed sulfides, one or more of which contain  
gold. Common sulfide assemblages are: asp, py, sp, ±stib, gn, teh,  
cpx, po (Minto); asp, sp, py, cpx, ±gn, teh (Olympic); stib, py, asp,  
±sp (Congress); asp, py, stib (Dauntless).

Quartz gangue associated with gold/sulfide mineralization is high in  
 $\delta^{18}\text{O}$ ; +14.7 to +25.1‰. A local bimodal distribution exists in  $\delta^{18}\text{O}$   
values such that quartz from sulfide rich mineralization is not as  $^{18}\text{O}$ -  
enriched as quartz from deposits with fewer sulfides (+16.7 ± 1.4‰, vs.  
+21.9 ± 1.2‰, respectively). Nevertheless, implications are that all  
mineralization in the area was deposited from highly evolved hydro-  
thermal fluids and not shallow epithermal fluids containing a signif-  
icant fresh meteoric component.

These deposits are included in a preliminary regional stable isotope  
survey which extends along a 25 km transect from the Bralorne-Pioneer  
lode gold deposits in the southwest to mercury and tungsten vein  
deposits in the northeast. All isotopic analyses of associated carbon-  
ate and quartz are enriched in  $\delta^{18}\text{O}$  with values increasing progress-  
ively from Bralorne-Pioneer (avg. +15.2 ± 1.3‰), northeast to the  
mercury and tungsten deposits (avg. +24.7 ± 3.7‰). The high  $^{18}\text{O}$   
character of the region implies that the entire district was mineral-  
ized by the same or similar deeply circulated hydrothermal fluids.

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## STRUCTURAL EVIDENCES FOR ACADIAN WRENCH FAULTING IN THE SOUTHEASTERN GASPE PENINSULA, QUEBEC

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Structural trend of Middle Paleozoic rocks of southeastern Gaspé Peninsula is  
NE-SW. Major E-W striking faults transect this trend and cross-cut the  
major tectonolithostratigraphic zones of this part of the Northern  
Appalachians: the Gaspé-Connecticut Valley Synclinorium, the Aroosook-  
Percé Anticlinorium and the Chaleurs Bay Synclinorium. The most  
important faults are: the Grande Rivière, Grand Pabos and Rivière Garin  
faults. Field evidences at all scales indicate dextral strike-slip movement.  
The fault zones consist of highly foliated and sheared rocks with abundant  
calcite veinlets. A vertical NE-SW trending penetrative cleavage (S),  
subparallel to the regional folds, is deformed by discrete ductile micro-shear  
zones (C). These are E-W trending dextral sets, subparallel to the main fault  
zones, ESE trending multiple sets of dextral shear bands, and conjugate sets of  
shear bands with opposite sense of shear trending ESE (dextral) and NNE  
(sinistral). All of these fabrics are subvertical and their orientations are  
indicative of an overall dextral sense of shear in the fault zones. Striations  
and stretching lineations, calcite fibre steps and grooves measured on the  
movement surfaces, together with the intersection of the conjugate shear bands  
as well as the intersection of C and S planes, suggest principally horizontal  
displacement. Macroscopic secondary faults form a complex pattern  
including Riedel-type fractures: R trends ESE, R<sup>1</sup> is NNW to NNE, P is ENE  
and D is E-W parallel to the main faults. This macroscopic pattern is similar  
to the microstructural arrangement of the micro-shear zones. Clockwise  
rotation of regional cleavage and folds near the fault zones, as well as  
stratigraphic evidences, indicate a dextral strike-slip movement along the  
major E-W faults. This wrench faulting represents the final stage of the  
Acadian orogeny in this part of the orogen.

## THE MINERALOGY OF MONT SAINT-HILAIRE, QUEBEC

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Mont Saint-Hilaire, Quebec has become Canada's most  
prolific mineral locality. Over 200 species have been  
identified from there, including 15 for which it is the  
type locality and several others are under study at  
Carleton University and the National Museum of Natural