

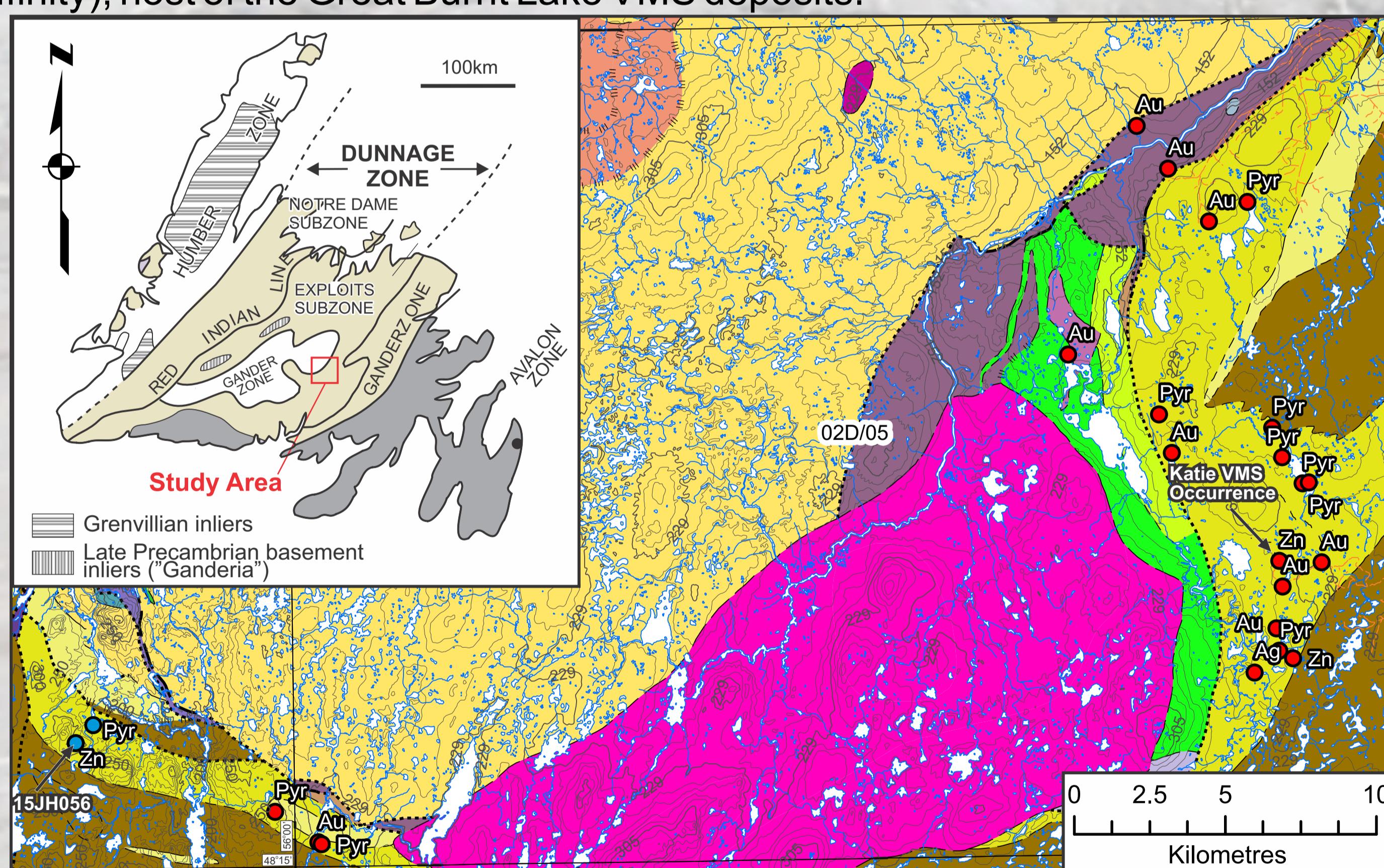
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## Volcanogenic massive sulphide (VMS) mineralization: central Newfoundland

In 2016, research continued on samples acquired during earlier field work in central Newfoundland. Work included petrographic, lithogeochemical, and geochronological research on samples from the North Steady Pond Formation of the Baie d'Espoir Group. This formation hosts the Katie VMS occurrence, as well as many other mineral occurrences, some of which were discovered during the present study. The goal is to document the styles of VMS mineralization, to characterize the host rocks, and to add to the tectonostratigraphic understanding of the area.

Geochronological studies on the quartz-phyric felsic volcanic rock that hosts the Katie occurrence returned an age of  $471.1 \pm 1.4$  Ma, similar to previously published ages from the Baie d'Espoir Group. However, lithogeochemical studies indicate that there are possibly two groups of felsic rocks in the vicinity of the Katie occurrence. The first group is composed of quartz-phyric felsic tuff and quartz-feldspar porphyry that display fractionated, LREE-enriched REE plots and extended trace-element plots with prominent Nb and Ti troughs, suggestive of a volcanic arc-type signature. These rocks host the Katie occurrence. The second group is composed of leucocratic, quartz-feldspar trondhjemite rocks that display relatively flat, un-fractionated REE patterns, and extended trace-element patterns with Nb and Ti troughs, suggestive of a volcanic arc-type granite. The latter displays geochemical patterns identical to those associated with the nearby Reid trondhjemite of the Coy Pond Complex, as discussed by Sandeman et al., 2012, and may have implications for the tectonostratigraphic architecture of the area.

Future work will include geochemical investigations on the North Steady Pond Formation, as well as petrographic, geochemical, and mineralogical work on samples from the North Salmon Dam basalt of the Cold Spring Pond formation (uncertain affinity); host of the Great Burnt Lake VMS deposits.



### Partridgeberry Hills Granite

Massive to weakly foliated, medium- to coarse-grained, chloritized and sericitized biotite granite ( $474 \pm 1$  Ma; zircon).

### Mt. Cormack Complex

Through Hills Granite - Garnet-tourmaline-muscovite syenogranite ( $464 \pm 1$  Ma; zircon)

Banded granitoid gneiss - probably derived from the Spruce Brook Formation

Spruce Brook Formation - interbedded quartzite, shale and metamorphic equivalents (older than Llanvirn-Llandeilo)

New Mineral Occurrences from this study

Select Mineral Occurrences from study area

### Coy Pond Complex

Ultramafic conglomerate - interpreted as Devonian or younger

Polymict conglomerate - argillite with clast supported polymict conglomerate (L.-M. Ordovician)

Reid trondhjemite - plagioclase-quartz porphyritic, sericite-chlorite altered suprasubduction zone plagiogranite ( $510 \pm 4$  Ma; zircon)

Gabbro and diabase - locally fine-grained indeterminate mafic rocks

Basaltic pillow lavas - black, aphanitic and massive, locally fragmental

Harzburgite, pyroxenite - massive to serpentinized peridotite and talc serpentine schist

### Pipestone Pond Complex

Equigranular pyroxene gabbro - dominantly medium- to coarse-grained.

Polymict conglomerate - argillite with clast supported polymict conglomerate (L.-M. Ordovician)

Decimetre-scale interbedded arkosic grey shale, sandstone and phyllite

Poorly sorted, clast supported polymict cobble to pebble conglomerate

Felsic volcanic rocks, tuffs and volcaniclastic sandstones (Huxter volcanic belt) ( $508-457$  Ma)

### Baie D'Espoir Group

North Steady Fm.

Sericite (Ser)

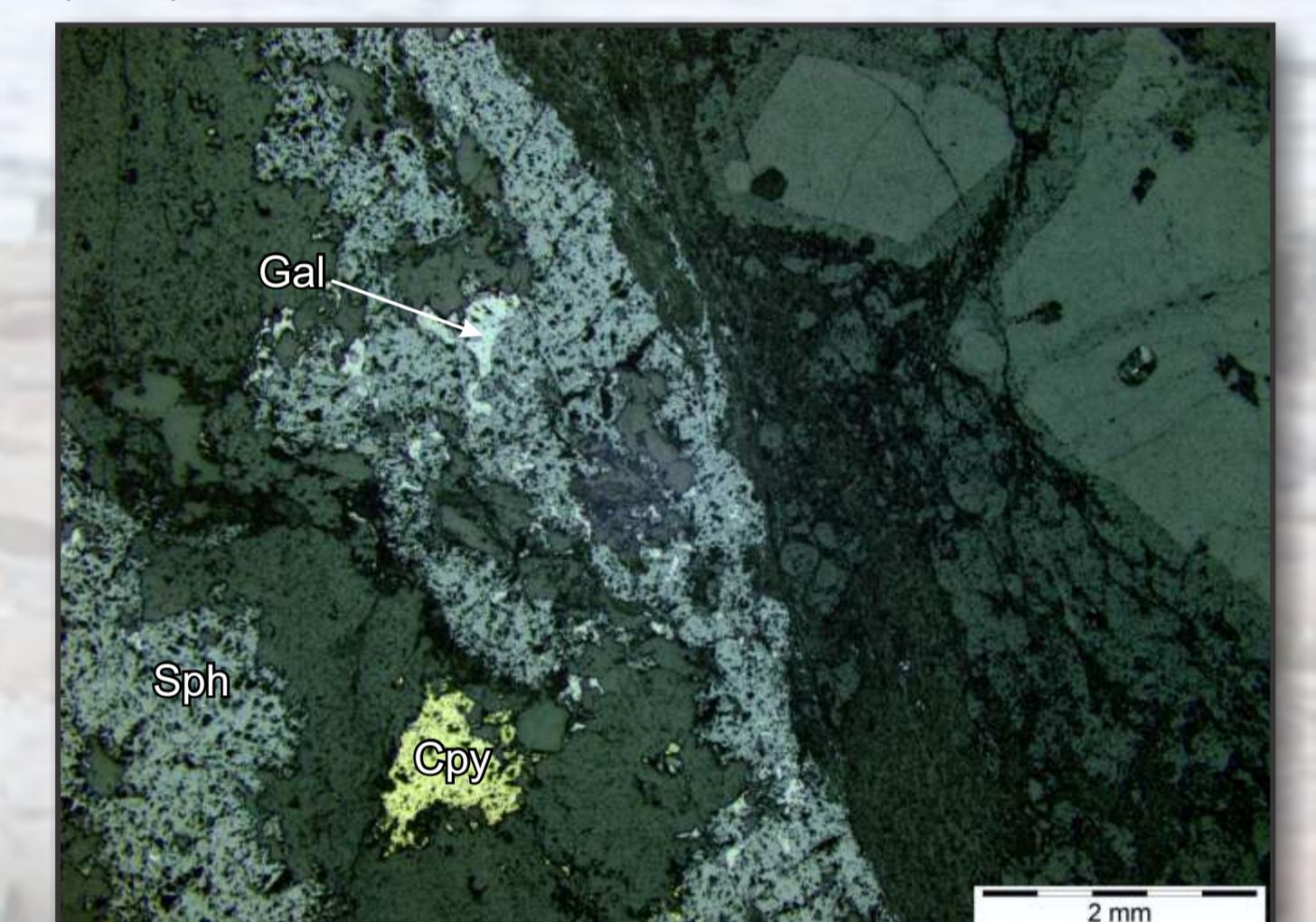
Pyrite (Py)

Silicate (Sil)

Sphalerite (Sph)



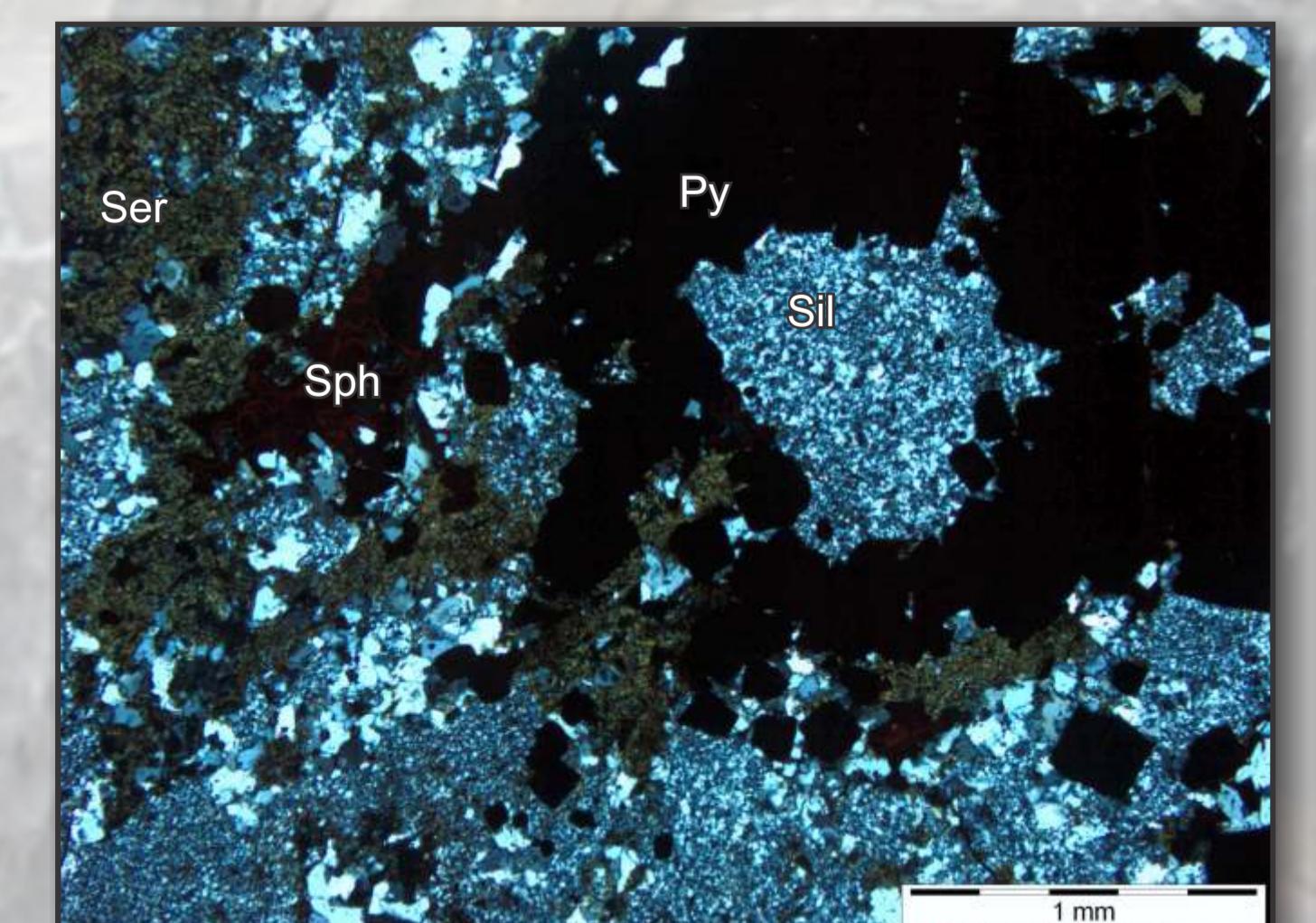
Quartz-phyric felsic volcanic host to the Katie VMS occurrence. This sample (15JH070) contains 11.1% Zn, 5.4% Pb, 0.3% Cu, 149 ppb Au and 31.8 g/t Ag. Alteration is composed of silica-sericite-pyrite. Alteration indices: Alteration Index of Ishikawa et al. (1976) AI = 90, chlorite-carbonate-pyrite index of Large et al., (2001) CCPI = 81.



Photomicrograph of the quartz-phyric felsic volcanic host to the Katie VMS occurrence shown in the picture above. Sph = sphalerite, Cpy = chalcopyrite, Gal = Galena.



Silica-sericite-pyrite +/- chlorite alteration zone (15JH056) discovered within quartz-feldspar porphyritic felsic volcanic rocks of the North Steady Pond Formation. Alteration indices: Alteration Index of Ishikawa et al. (1976) AI = 84, chlorite-carbonate-pyrite index of Large et al., (2001) CCPI = 91.



Photomicrograph of the quartz-feldspar porphyritic felsic volcanic rock shown in picture above (15JH056). Note the presence of sphalerite (Sph) in association with the silica-sericite-pyrite +/- chlorite alteration.

Simplified geological map of the study area (adapted from S. Colman-Sadd and S. Swinden). Age dates are from earlier work by S. Colman-Sadd and H. Sandeman and from this study.