

#### Snow Lake Gold Metallogeny

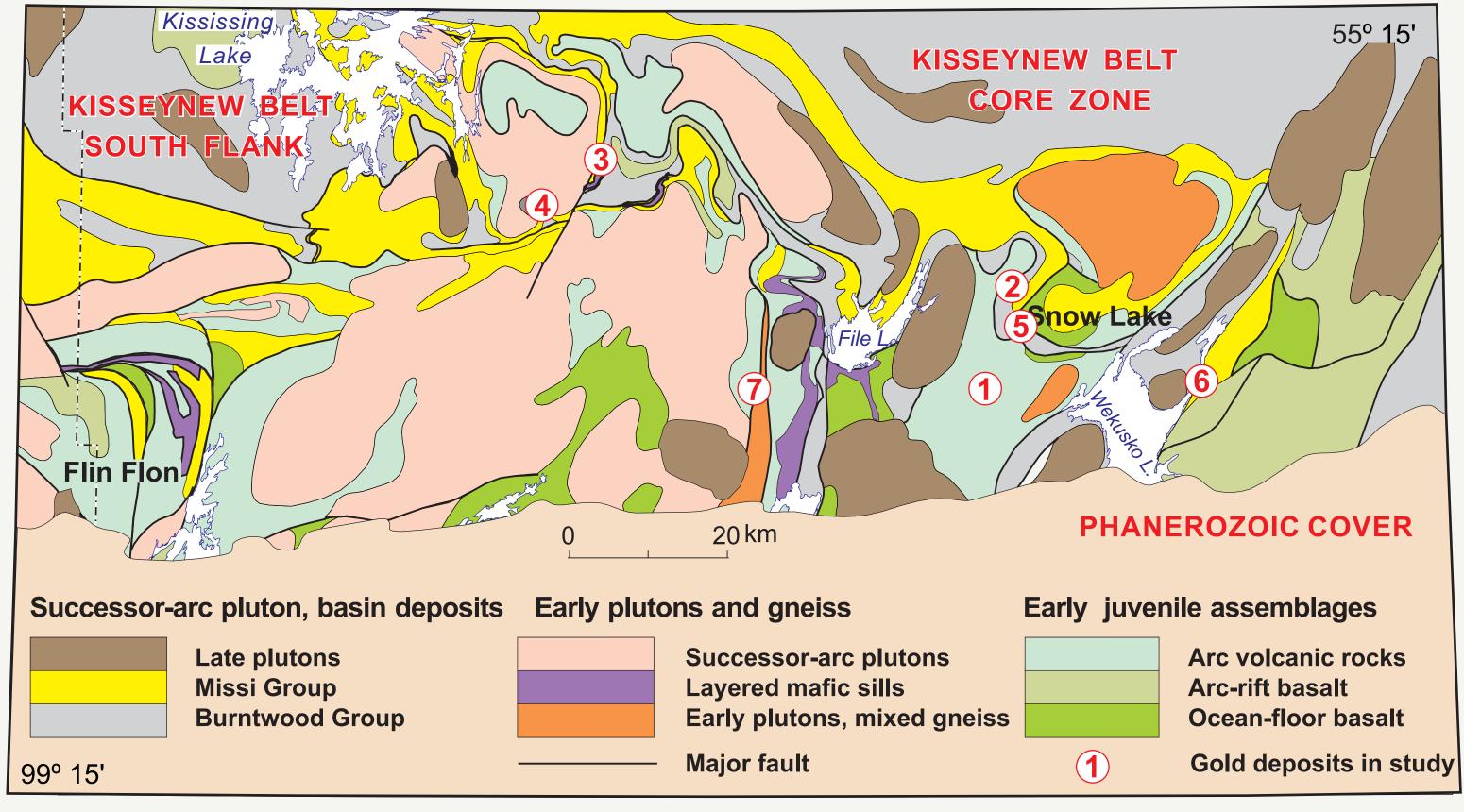
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### 1. McGill University **Project Summary**

This project aims to develop a regional gold metallogenic model for the Snow Lake area. The initial fieldwork focussed on structural analysis and metallogeny in the New Britannia mine and the Northstar Lake areas. Future fieldwork will address the analysis of additional gold deposits, culminating in a synthesis of gold deposit formation within the tectonic framework of the Snow Lake area. The regional aspect of this project is intended to encourage regional gold exploration and provide support for the more detailed fieldwork of the accompanying PhD project (below).

The accompanying Ph.D. Project represents a cooperative three-year project between the MGS and GSC to support a PhD student based at McGill University. The focus of this study is the effects of medium to high-grade metamorphism on mineral deposits, largely focussed on gold-sulphides mineralization. Fieldwork includes detailed mapping and geochemistry, and isotopic studies of a series of mineral deposits in an attempt to characterize the effects of post-depositional metamorphism on the distribution or possible redistribution of mineralization within the selected deposits. An aspect of this research will be included in the regional gold metallogeny project.

## **Project Location**



Generalized geological map of the Snow Lake area, showing the location of the selected gold deposits: 1) Chisel North mine, 2) Squall Lake, 3) Nokomis Lake, 4) Puffy Lake mine, 5) New Britannia mine, 6) East Wekusko Lake, and 7) North Star Lake.

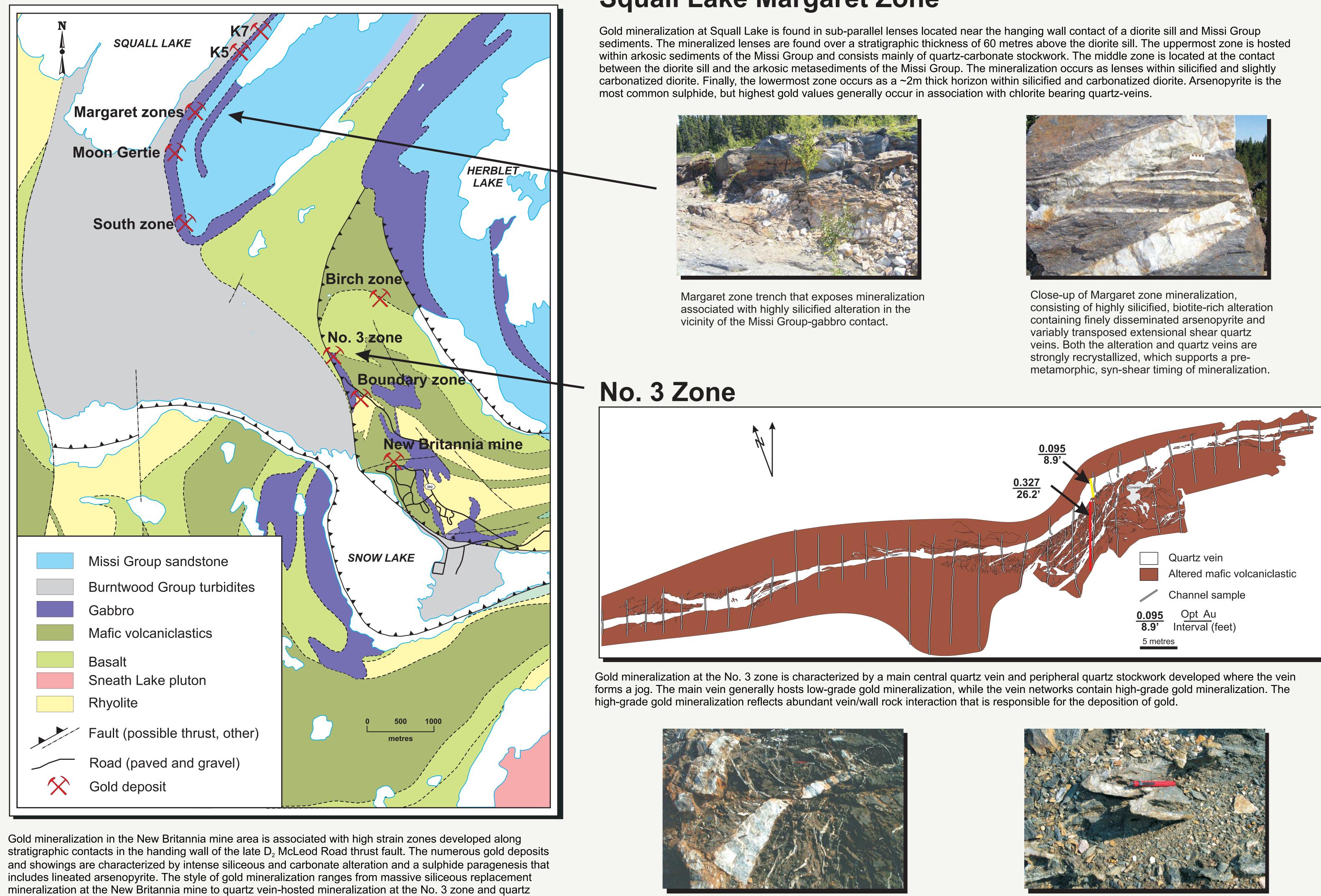
# **Tectonic Framework**

Mineralization <sup>19</sup>	900	1850	1800	1750	
		? —			
Deformation	Accretion			Brittle Faulting	
	D <sub>1</sub>	$D_2$	$D_3$	$D_4$	
Metamorphism			Peak		
Sedimentation 	Burnt	wood Group ⊢⊖⊣ Missi Group → ⊢⊙⊣			
Magmatism			HH	)	
Volcanism	Pre-Accretion	Missi Group		U-Pb Ag ⊢⊡⊣ Zircon U-P ⊢o⊣ Zircon Pb-I	<b>e Data</b> b Age, 2σ error Pb Age, 2σ error
Age (Ma) 1920 1910 19	900 1890 1880 1870 18	60 1850 1840 1830 18	20 1810 1800 1790 1	780 1770 1760 1750 1740 17	30 1720 1710 1700

Cladogram depicting the tectonic framework for gold mineralization in the Flin Flon - Snow Lake greenstone belt. This study attempts to resolve the two periods of gold mineralization in prograding metamorphic conditions, with an emphasis on the possible remobilization of gold mineralization during peak metamorphism.





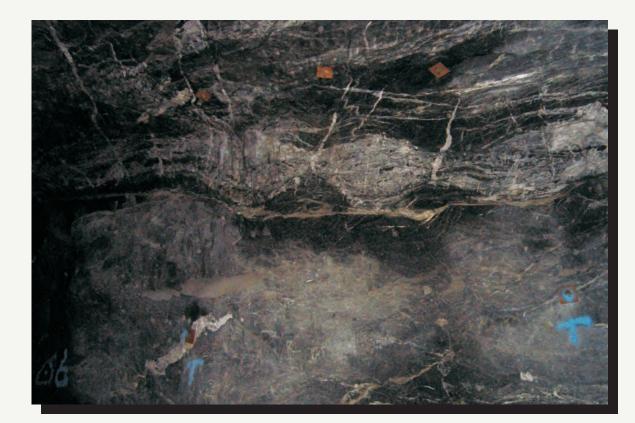


stockwork mineralization at the Birch zone. The absolute timing of gold deposition is not fully understood, but appears to largely pre-date movement on the McLeod Road thrust fault, and also pre-dates peak metamorphic conditions

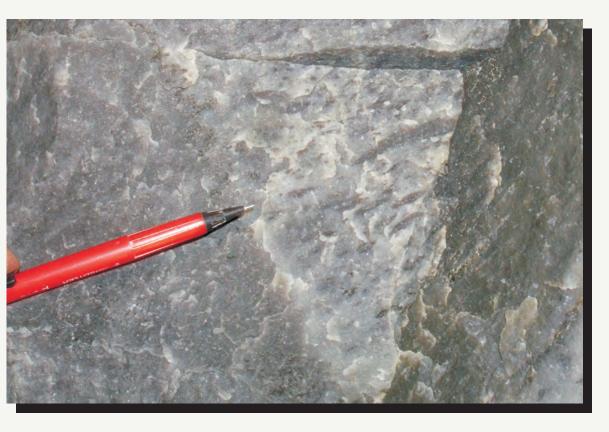
### **New Britannia Mine**



Highly silicified QCMS (quartz-carbonate-mica schist) mineralization from the 3725 mine level. Note the emplacement of extensional quartz veins as the mineralization was deformed.



Dextral shear bands and foliation boudinage developed in QCMS mineralization.



The deformational origin for the mineralization is supported by the strongly lineated nature of the mineralization.



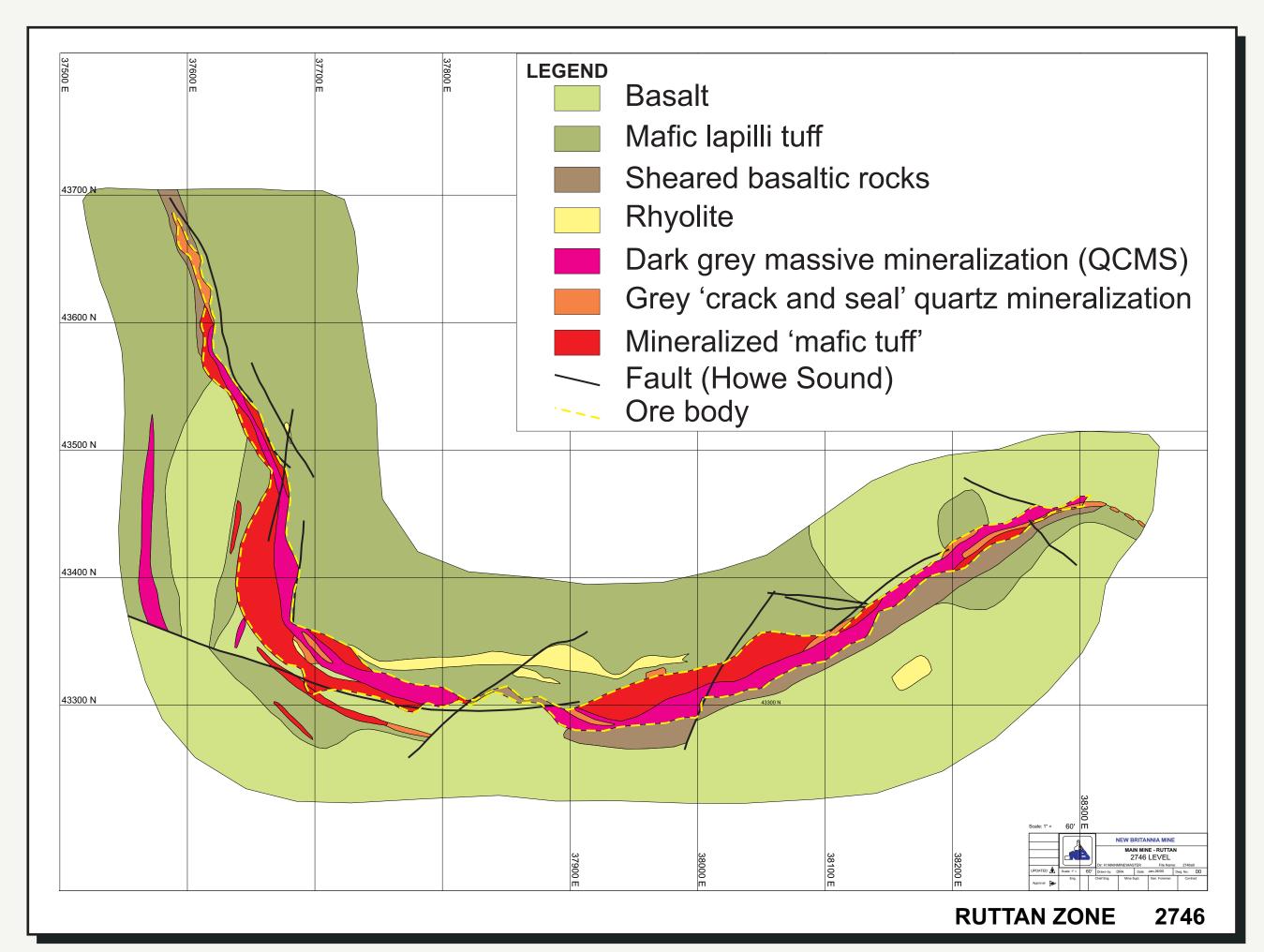
Dark grey massive mineralization (QCMS) including boudinaged quartz veins parallel to the composite S<sub>1</sub>/S<sub>2</sub> transposition foliation.

## **New Britannia Mine Horizon** Squall Lake Margaret Zone



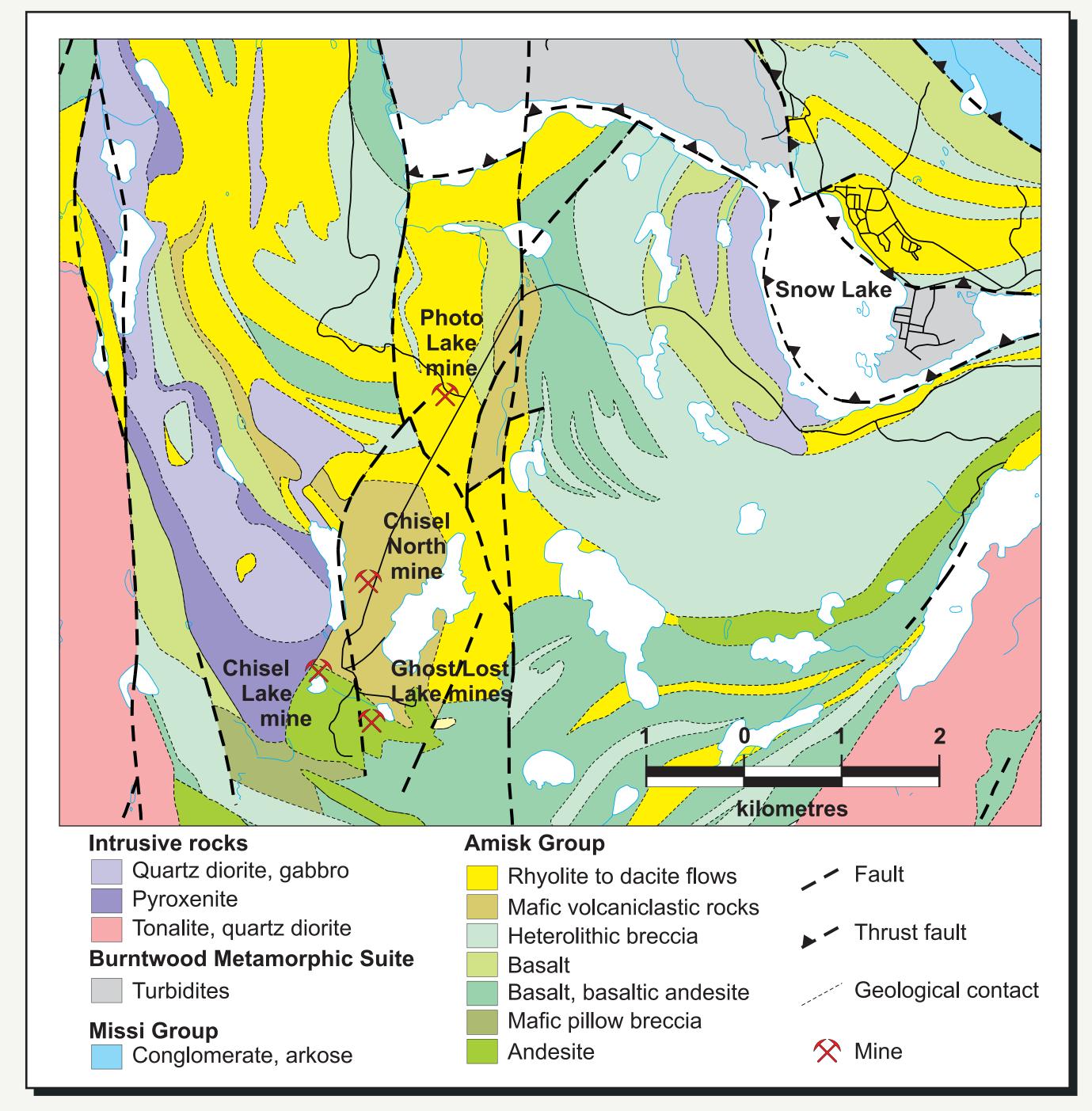
Three Zone surface exposure comprising laminated quartz veining, ladder veins hosted within an intensely ankerite-biotite altered shear zone. Note the open F<sub>3</sub> folding of the main vein and ladder veins and the increased ankerite in areas of high vein

Shallowly east-plunging F<sub>2</sub> fold of shear fabricparallel (transposed) quartz vein from Three Zone. This relationship is consistent with syn- to pre-D<sub>2</sub> emplacement of the quartz veins.

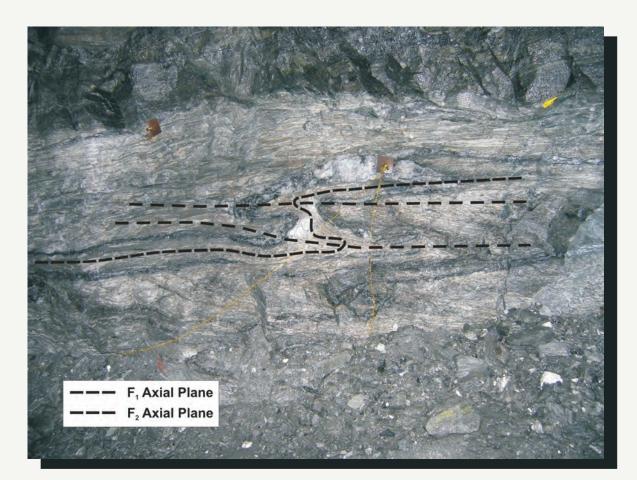


Gold mineralization at the New Britannia mine comprises three main styles: (1) dark grey massive replacement (QCMS), (2) crack seal vein networks and (3) mineralized mafic tuff. The distribution of these mineralization types forms a thick (>10m) ore zone located along major rheological boundaries.

## **Chisel North Mine**



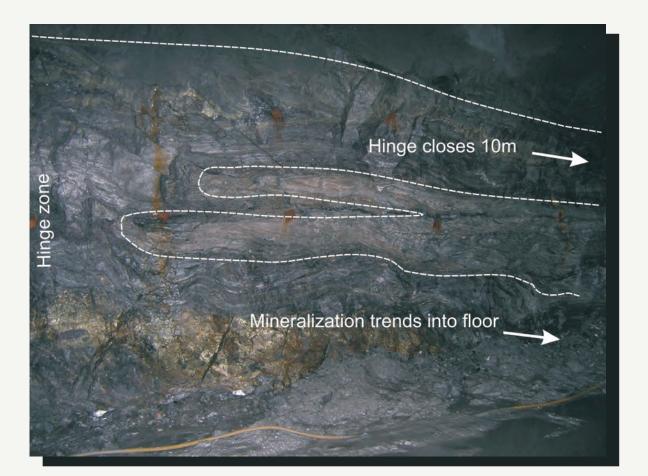
The Chisel North deposit represents a zinc-rich volcanogenic massive sulphide deposit containing a hangingwall zone enriched in gold. The ore typically consists of up to 20 metres of silicate-/ dolomite-rich semi-massive sphalerite-rich ore with thin interlayers of massive sulphides and is underlain by discordant zones of disseminated and vein sulphide. The underlyin onsists of recrystallized, hydrothermally altered rocks now consisting of sericite, chlorite with common kyanite, biotity staurolite, and garnet porphyroblasts. Sphalerite and pyrite are the main sulphide phases although massive pyrrhotite occurs near the hanging-wall. The orebody is stratigraphically underlain by a broad, hydrothermal, alteration zone hosting sericite and chlorite rich lenses containing Zn, Fe, Pb, Cu, As, Au and Ag. Throughout the Chisel Basin, the ore horizon is typically overlain by a thick package of mafic wackes. In the No. 4 lens of the Chisel North deposit, the hanging-wall of the zinc ore is formed by an altered basalt that is locally enriched in Au-Ag-As-Cu-Pb. The nature of this Au-Ag-As-Cu-Pb mineralized zone is still ambiguous



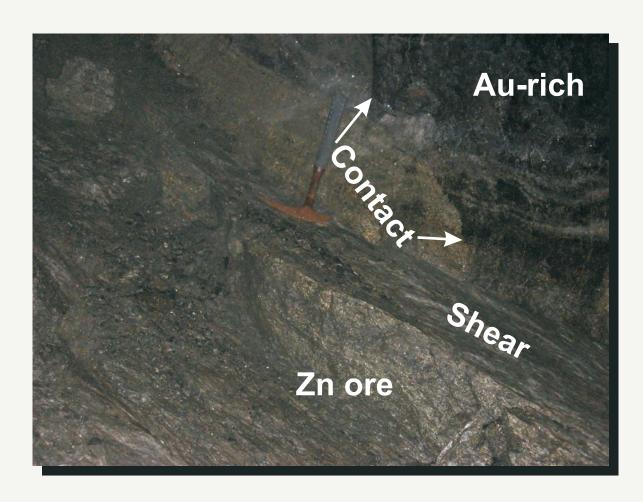
Isoclinal F<sub>1</sub> fold refolded by recumbent F<sub>2</sub> fold (looking east) in the 2 Zone 5 South lower stope.



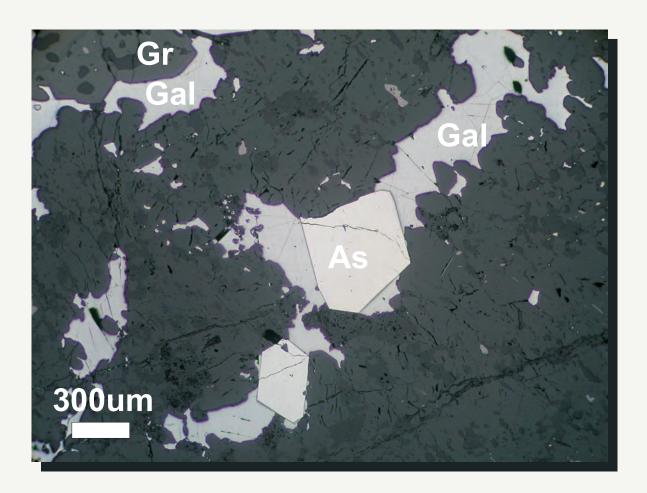
Weak S<sub>3</sub> foliation developed in mineralized sericite schist in the 2 Zone 5 South lower stope.



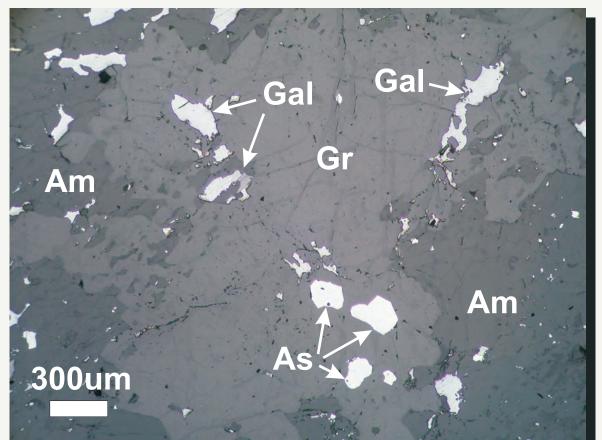
F<sub>2</sub> hinge zone showing the effect of folding on the distribution of sphalerite-rich high grade mineralization in the 2 Zone 11 South upper stope.



The upper (hanging wall) contact of the zinc ore zone. The Au-rich zone is located immediate above this contact.



Plane polarized reflected light photomicrograph of matrix galena (Gal) in amphibolite (Am) with euhedral grains of arsenopyrite (As) included in the galena. In the upper left, galena is in contact with garnet.



Plane polarized reflected light photomicrograph or garnet (Gar) in amphibolite with galena (Gal) and subhedral grains of arsenopyrite (As) as interstitia sulphides

Manitoba