

PLATINUM-GROUP ELEMENTS

GEOLOGICAL SYNOPSIS

Alkaline intrusions of Late Triassic to Early Jurassic age and younger are important hosts to Cu-Ag-Au+/-PGE mineralization in British Columbia. They occur in the erranes of Quesnellia and Stikinia and most mineral occurrences lated to an alkaline porphyry deposit model.

This poster presents new geochemical and mineralogical data for the PGE-bearing

The samples represent Early Mesozoic mineralization at Sappho (new Ar-Ar Hb date of >156 Ma), Maple Leaf (Averill Complex; >150 Ma), Afton and Lorraine; prospect at Friday Creek peripheral to Copper Mountain; and the Early Tertiary Allendale intrusion (preliminary Hb Ar-Ar date ~ 64 Ma; Coryell equivalent). The latter occurrence indicates that potential for economic Cu-Ag-Au-PGE mineralization is not restricted to the Early Mesozoic alkaline complexes.

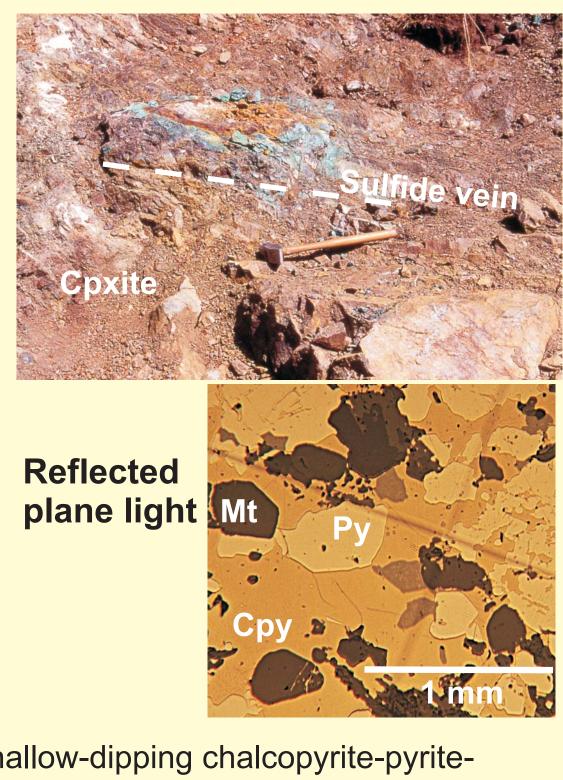
Friday Creek Bornite								
Method	Cu wt%	Ag g∕mt	Pt ppb	Pd ppb	Au ppb	Hg ppb	Te ppm	Sample wt (g)
1 Aqua Regia*	60	286	59	82868		28732	128	1
1 Fire Assay*			23	60997	122			15
1 Fire Assay**			<5	24200	432			10
2 Aqua Regia*			129	47906				1
2 Fire Assay*			143	57330	240			15
2 Fire Assay**			211	57800	264			10
* A ama Labaratariaa ** A ativatian Labaratariaa								

* Acme Laboratories *Activation Laboratories Analyses of 2 samples of massive bornite from pegmatitic Kspar-biotite vein cutting diorite (MINFILE 092HSE033)

Afton Cu-Au-PGE Sulfides									
	Cu wt %	Ag g/mt	Pt ppb	Pd ppb	Au ppb	Hg <i>ppb</i>	Te ppn		
Cpy (v)	5.8	21	3	193	6276	26270	0.4		
Native Cu (v, d)	4.4	8.9	15	208	7218	>99999	0.5		
Bn (d)	7.9	15	94	983	7564	1234	0.3		
Cpy (d)	7.3	16	143	2424	5176	2901	0.1		
Cpy (v, d)	2.8	3.4	36	1179	3608	494	0.1		
Cpy (d)	4.1	3.4	92	3507	7764	615	0.3		
d, disseminated	v, ve	ein							

Analyses of mineralized core from the 2000-2001 deep drilling program of DRC Resources at the Afton pit

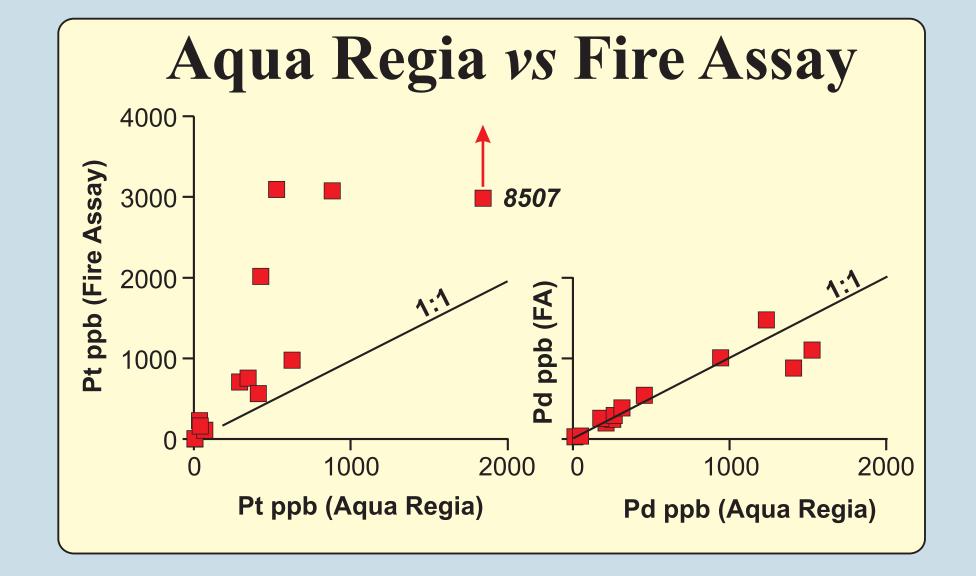


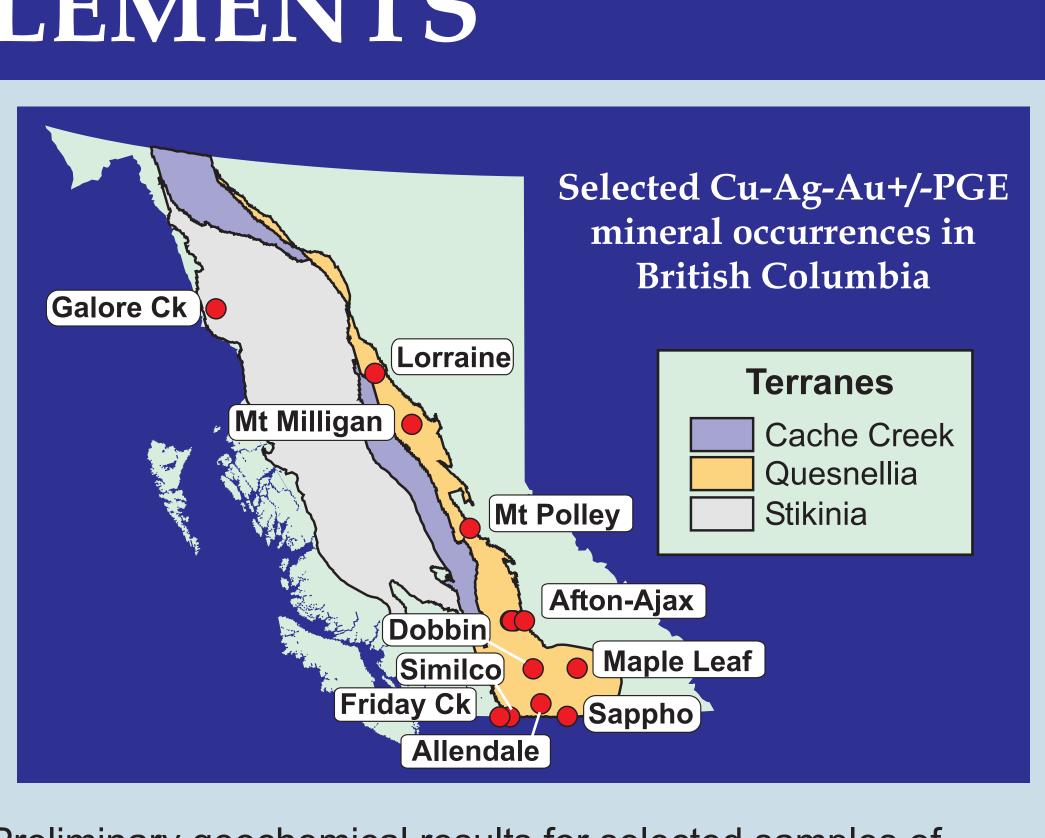


nagnetite veins cutting biotite-hornblende clinopyroxenite ("Bullseye" trench)

	<u>Aqua</u>	<u>Regia</u>	<u>Fire Assay</u>			
Sample	Cu	Ag	Pt	Pd	Au	
	wt %	g/mt	ppb	ppb	ppb	
01GNX 9-2-4	9.4	28	713	96	72	
01GNX 9-2-5	7.8	36	761	206	105	
01GNX 12-2-1	6.9	56	567	729	189	
01GNX 12-2-2	8.7	108	981	1226	609	
01GNX 12-2-3	25.6	254	2018	938	2263	
01GNX 12-2-4	24.5	312	3099	454	1876	
01GNX 12-2-5	7.6	126	8507	1519	641	

Analyses of mineralized monzonite xenoliths and host Kspar-porphyritic biotite-clinopyroxene monzonite





Preliminary geochemical results for selected samples of sulfide mineralization in a number of alkaline-hosted Cu-Ag-Au-PGE occurrences are tabulated below. Features to note include:

- of sampling
- conventional fire assay

	<u>Aqua</u>	<u>Regia</u>	<u>Fire Assay</u>			
<u>Sample</u>	Cu	Ag	<u>Pt</u>	Pd	Αι	
	wt %	g/mt	ppb	ppb	pp	
01FND-1-1-1	6.3	146	8	216	19	
01FND-7-1-1	1.3	17	26	131	32	
01GNX 25-1-1	4.2	73	17	173	11	
01GNX 25-1-2	5.3	107	8	174	20	
01GNX 25-1-3	3.3	60	16	147	6	
01GNX 25-1-4	12.6	164	4	1265	34	
01GNX 28-1-1	0.7	11	52	139	33	
Analyses of m	ineralize	d monzoi	nite xeno	liths an	d ho	

Maple Leaf Cu-PGE Sulfides								
	<u>Aqua R</u>	egia	<u>Fire Assay</u>					
<u>Sample</u>	Cu	Ag	<u>Pt</u>	Pd	Au			
	wt %	g/mt	ppb	ppb	ppb			
01GNX 15-1-1	0.2	2	22	38	100			
01GNX 15-2-1	0.6	6	90	89	326			
01GNX 15-4-1	3.4	140	1747	4604	1093			
01GNX 15-4-2	0.6	17	37	196	962			
01GNX 15-4-3	4.7	65	1580	7528	1460			
Analyses of chalcopyrite-bearing syenite								

Geofile 2002-2 Cu-PGE Mineralization in Alkaline Plutonic Complexes

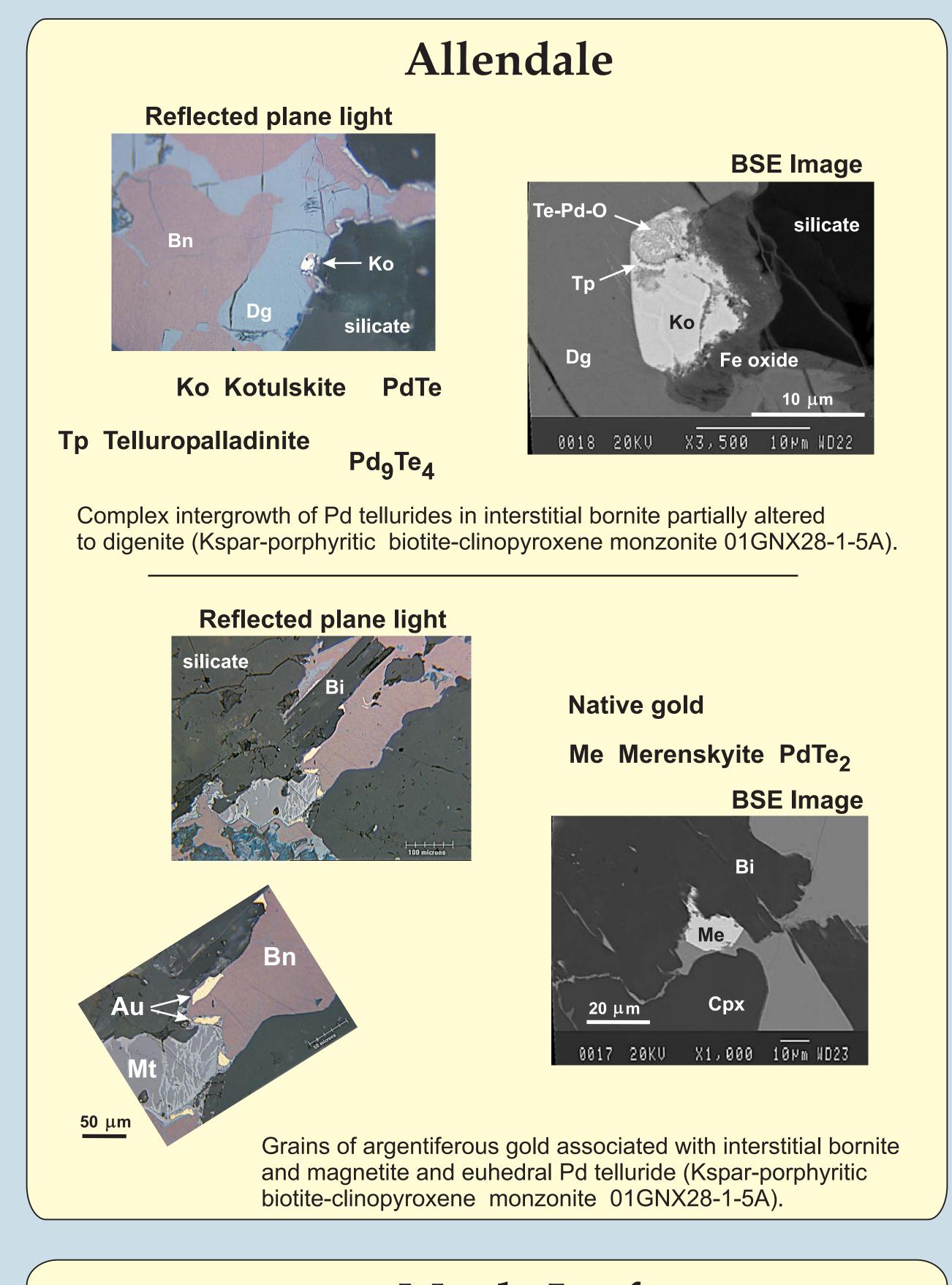
Graham T. Nixon - B. C. Geological Survey and J. H. Gilles Laflamme - CANMET

PLATINUM-GROUP MINERALS

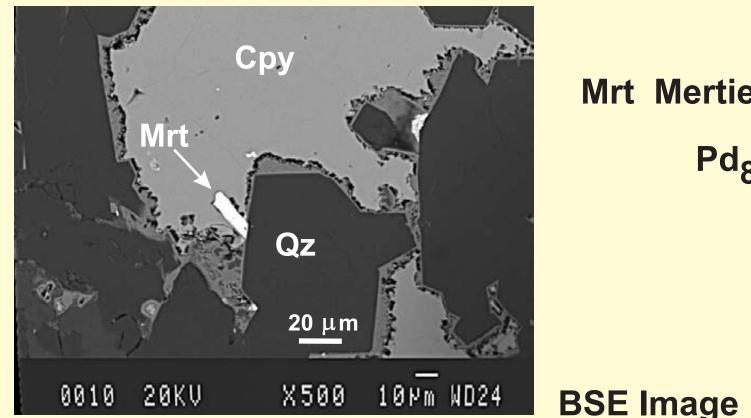
Ongoing investigations of the mineralogy of PGE-enriched Cu-Fe sulfides have identified a number of PGM including:

various palladium tellurides - merenskyite, kotulskite and telluropalladinite, a palladium antimonide - mertieite II, and a palladium-tellurium oxide.

All are associated with disseminated bornite or chalcopyrite, and locally, native gold.



Maple Leaf



Mrt Mertieite II Pd₈Sb₃

Backscattered electron image of a Pd antimonide in contact with quartz in chalcopyrite with a goethite-like rim (01GNX15-4-4).

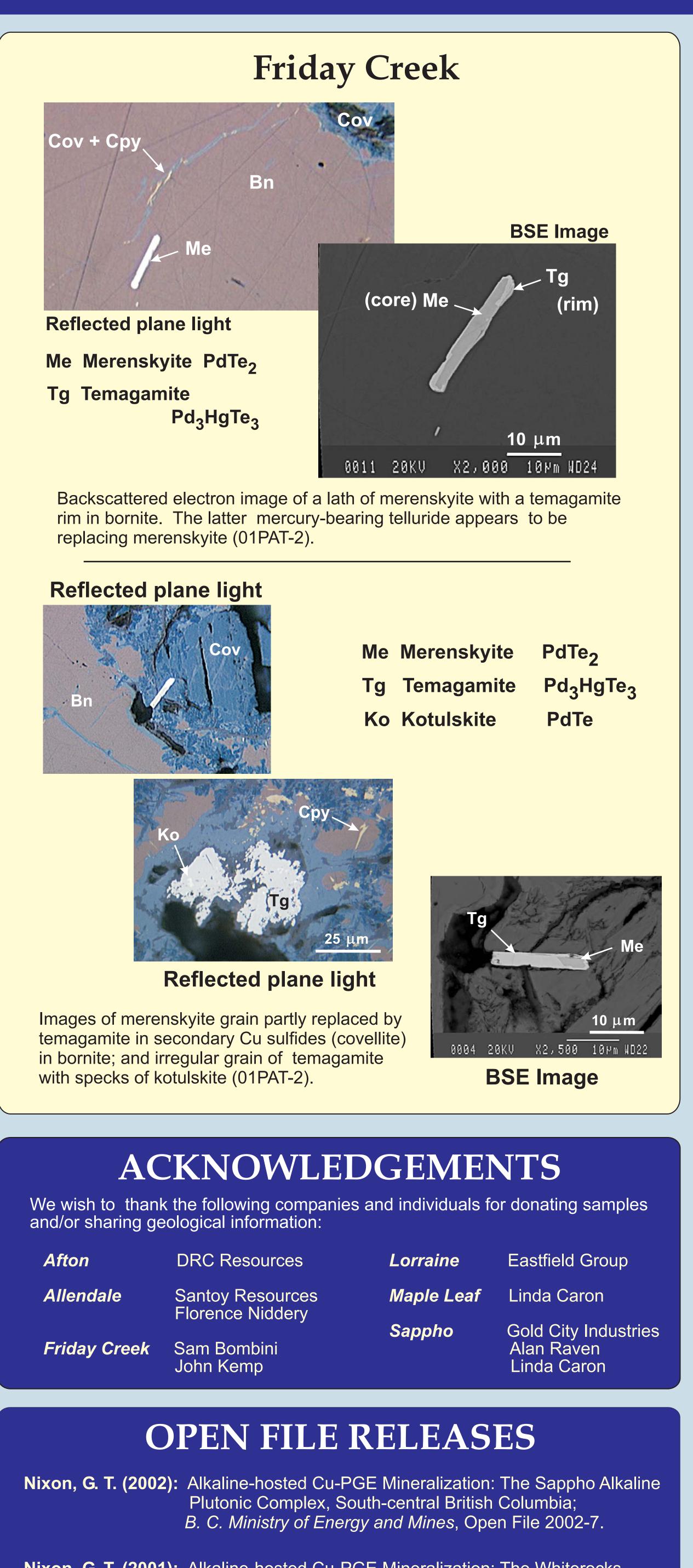
 unusually high Pt/Pd ratios in sulfide samples from **Sappho** relative to those from other alkaline environments

 extremely high Pd abundances and Pd/Pt ratios for the bornite occurrence at *Friday Creek* which is hosted by a biotite-Kspar pegmatite vein. The variable Pd enrichment is likely due to a "nugget" effect at the scale

• the high Au in sulfides at Afton and low abundances of Hg and Te in Pd-rich samples (compare Friday Creek)

 poor recovery of Pt relative to Pd using a commercially available aqua regia digestion technique rather than

at the Maple Leaf adit, Averill Plutonic Complex

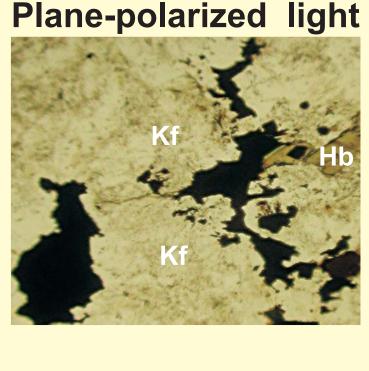


Nixon, G. T. (2001): Alkaline-hosted Cu-PGE Mineralization: The Whiterocks Mountain Alkaline Plutonic Complex, South-central British Columbia; B. C. Ministry of Energy and Mines, Open File 2001-14.

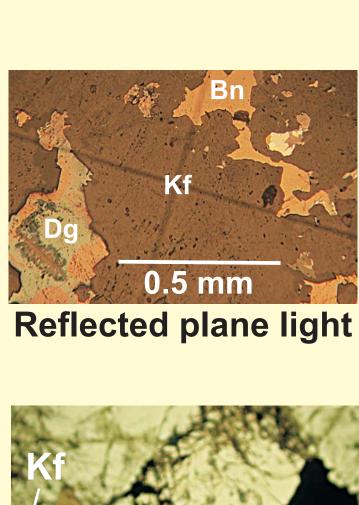
SULFIDE MINERALIZATION: IS THERE A MAGMATIC COMPONENT?

Sulfide-silicate textures and the limited development of alteration assemblages, at least locally, raise the possibility that an orthomagmatic component may exist in some alkaline porphyry systems. The textural and mineralogical features identified below require much more detailed investigation to decipher their true origin.

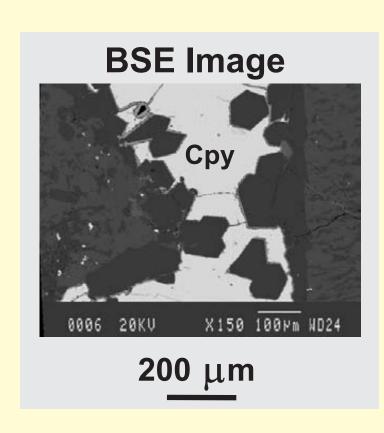
Magmatic or Hydrothermal Textures?



clinopyroxene-rich zones in biotite monzonite (01GNX28-1-1). Note faceted nature of clinopyroxene agains^{*} bornite and fresh Kspar lightly dusted with clay



ninated chalcopyrite in trachytic syenite by malachite vein. Note angular boundaries sulfides are largely controlled by crystal margins which are lined by minute crystals, and weak alteration (moderate clay development) alkali feldspar (Pe) (01GNX15-4-1A).



X-Ray Maps

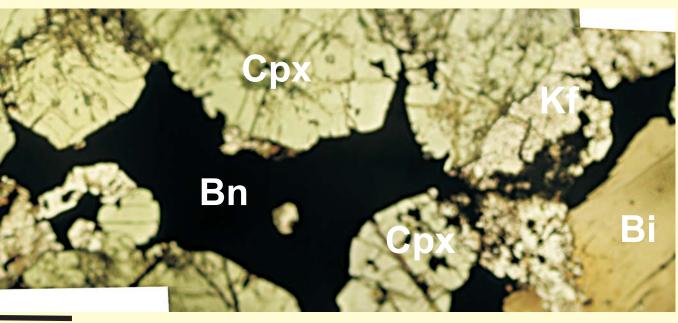
EMP X-ray element maps of euhedral quartz and albite crystals at chalcopyrite-alkali feldspar contacts (Na intensity in sulfide is due to Cu-Na peak overlap). Texture records either final stages of magmatic crystallization in guartz-bearing syenite, or recrystallization of magmatic sulfides, or introduction of sulfides preferntially along grain boundaries by low-T hydrothermal fluids during argillic alteration (01GNX15-4-4).





Allendale

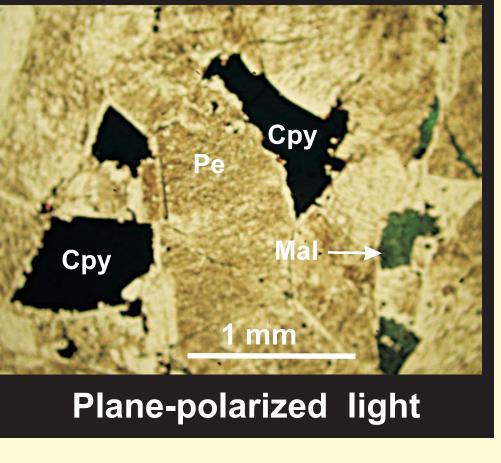
Interstitial bornite (partially altered to idenite and covellite) enclosed in fresh Kspar lightly dusted with clay minerals (Kspar-porphyritic biotite-clinopyroxene monzonite 01GNX28-1-4).

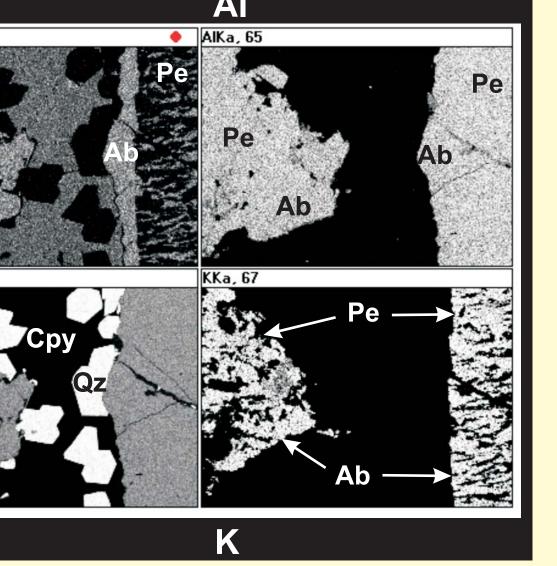


1 mm

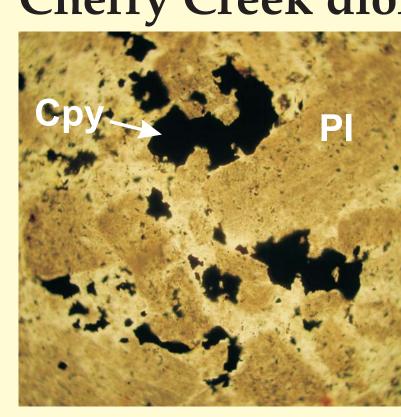
Plane-polarized light

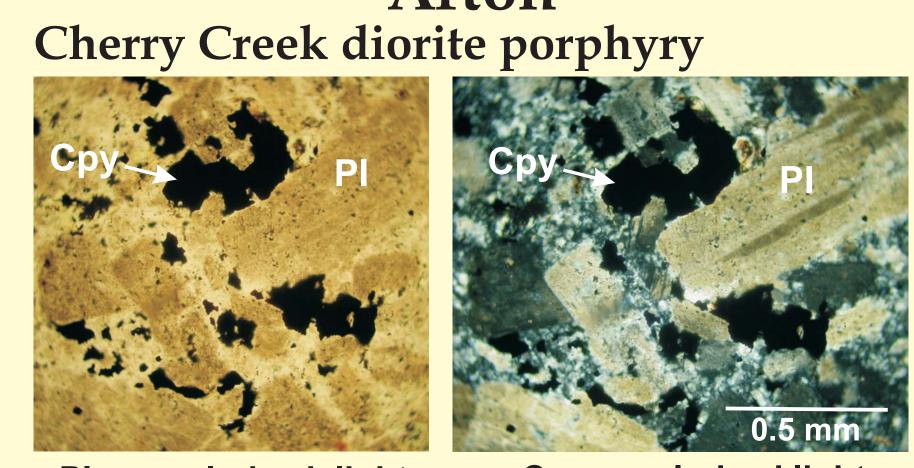
Maple Leaf





Afton

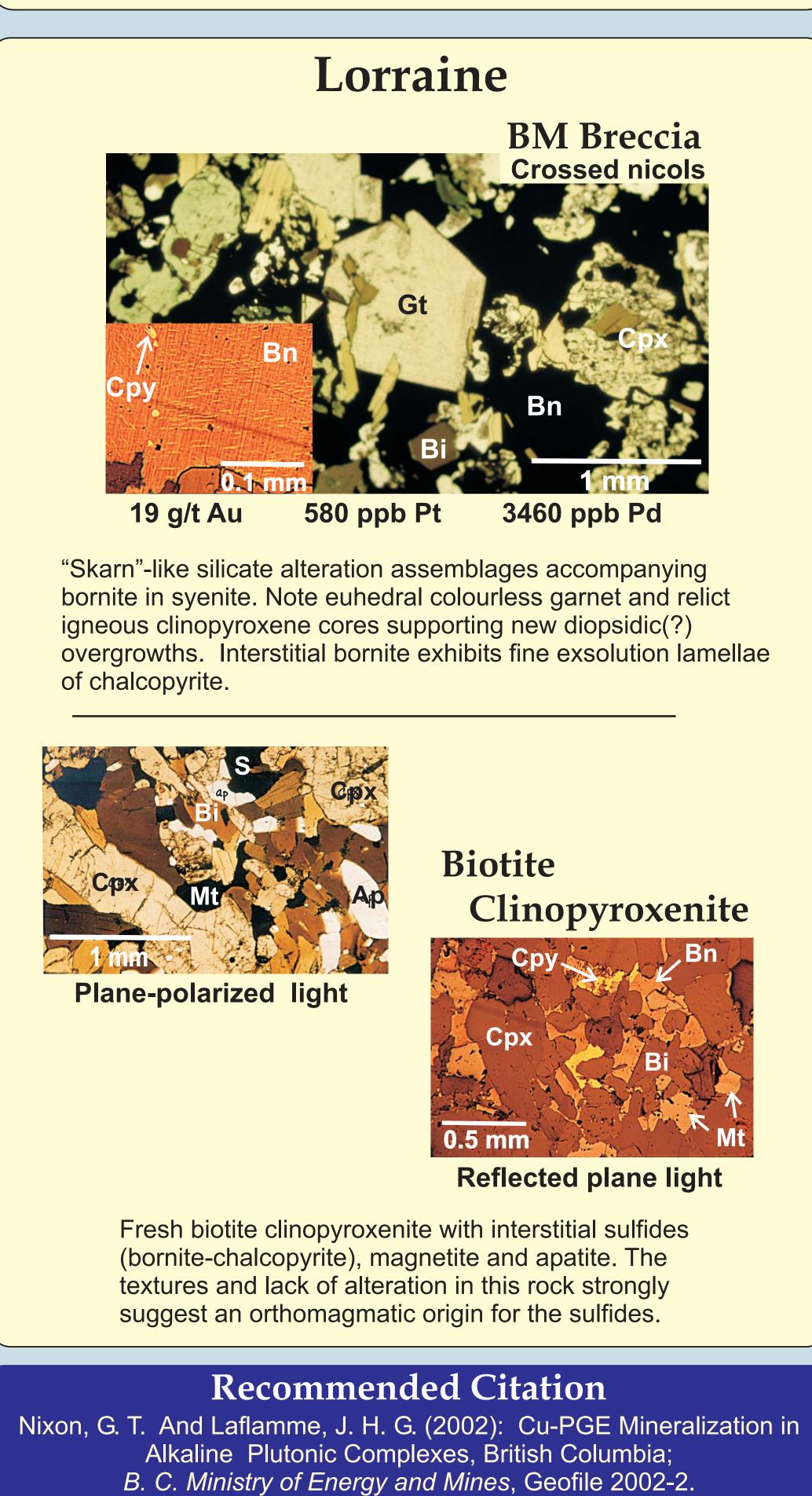




Plane-polarized light

Cross-polarized light

Disseminated chalcopyrite in plagioclase porphyry with weak argillic alteration. Note the preferential occurrence of sulfides in the groundmass and delineation in part by phenocryst margins (01GNX19-11-1)



Cartography and Graphic Design By: Mike A. Fournier, *Ministry of Energy and Mines*