predictive mineral discovery
COOPERATIVE RESEARCH CENTRE

MERIWA

Scale-Integrated Alteration Studies at Kanowna Belle

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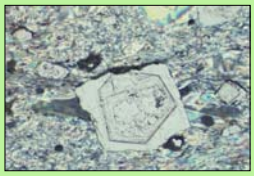
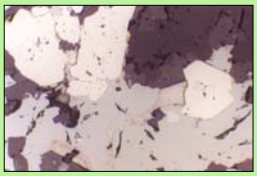
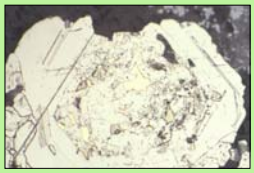
KB Sulfide Evolution

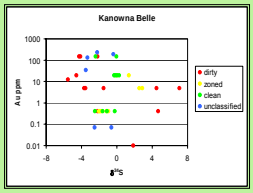


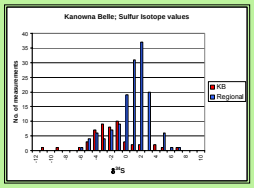


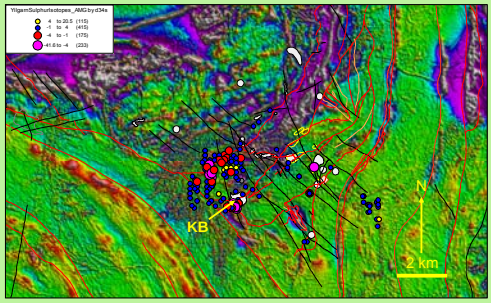


•Dirty pyrite cores with Au, Te, basemetal & gangue inclusions
•As-rich and As-poor growth bands
•Clean inclusion-free euhedral pyrite overgrowths
•Late Au, Te & sulfosalt infill (remobilised or new addition??)

KB Sulfur Isotopes



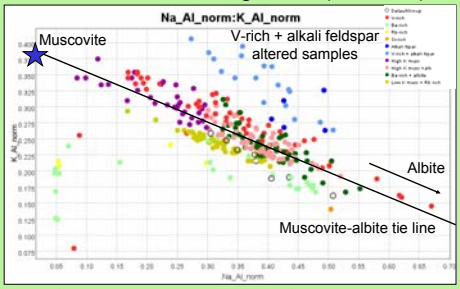




•High Au grades correlate with -ve $\delta^{34}S$ values in dirty pyrite cores.
•$\delta^{34}S$ values in zoned pyrite are between -2.8 and 2.9 per mil.
•Clean pyrite rims are -2.5 to 0.3 per mil.
•KB pyrites record a history of oxidised fluids early in the evolution of the deposit gradually becoming swamped by reduced fluids.
•Regional $\delta^{34}S$ values are clustered around 2 per mil

KB Alteration Geochemistry

Lowes Shoot Alkali Signature (GDD438)

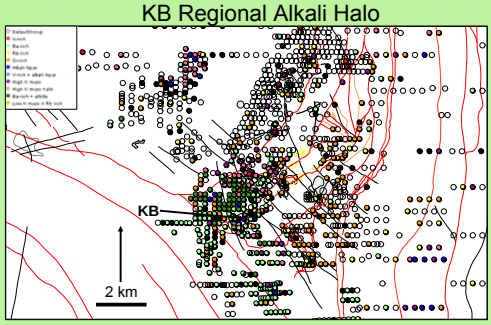


A plot of K/Al vs. Na/Al molar ratios quantifies alteration mineralogy.
There is too much K in samples above the tie line for muscovite. These samples must contain a component of K feldspar, i.e., the feldspar = alkali (Na + K) feldspar.

Lowes Shoot Pathfinder Signature (GDD438)

Pathfinder elements typically associated with Au include W, Mo, Te, Bi, Sb and As. V-rich, alkali feldspar + high K/Al muscovite alteration occurs proximal to gold mineralisation. The distal signature is characterised by low K/Al, Ba-rich sericite ± albite.

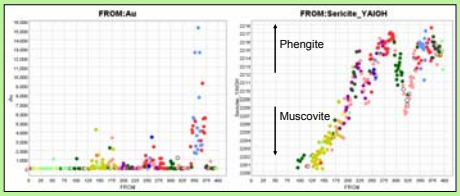
KB Regional Alkali Halo



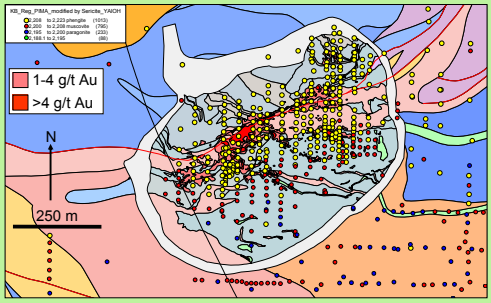
Regional multielement geochemistry highlights several areas around KB with similar alteration signatures.

KB Short Wave Infrared (SWIR) Spectral Mapping

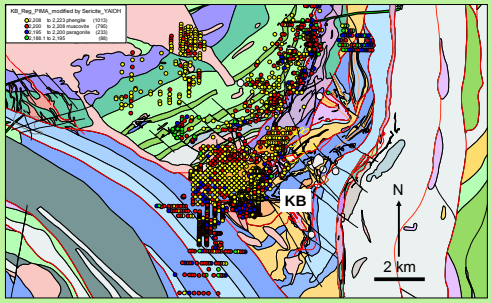
Lowes Shoot SWIR AlOH Wavelengths



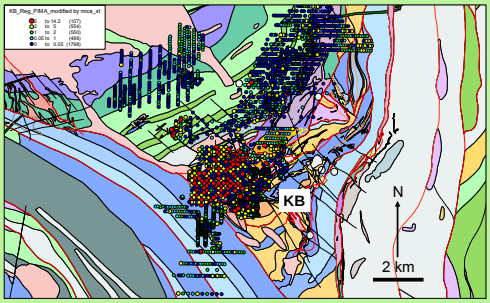
•White mica AlOH absorption wavelengths across Lowes Shoot are zoned from phengitic compositions (2212-2216 nm) to muscovitic compositions (2200-2204 nm).
•Gold in Lowes Shoot occurs predominantly within phengititc white mica domains near the tranistion to muscovitic AlOH wavelengths.
•Ore-related phengites have elevated V (650 ppm), Mg (2 wt. %) and high K/Al ratios (0.38 - 0.40) relative to muscovite (V = 250 ppm, Mg = 0.5 wt. %, K/Al = 0.33) in the distal envelope.
•Barium contents (2800 ppm) are higher in distal muscovite than in proximal phengite (1500 ppm).

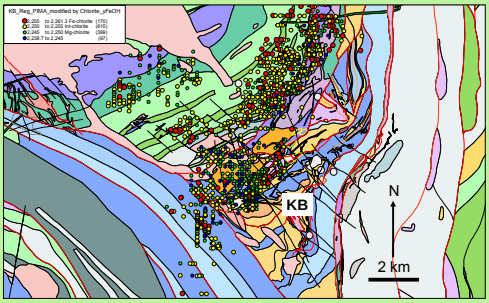


The correlation between gold and white mica gradients is evident at all scales across KB.



The regional KB spectral map is dominated by a cell of phengitic white mica alteration surrounded by a muscovite envelope. The transition to muscovite alteration occurs along the major D1/D2 structures. KB is situated on the edge of the phengite plume in a strong white mica gradient





•A map of the mica crystallinty index shows that highly crystalline micas occur in the core of the phengite cell. Low crystallinity white micas occur around the edges.
•We interpret variations in white mica crystallinity to reflect a temperature gradient from high in the core to low around the edges. Low temperatures on the margins possibly caused pH to decrease below phengite stability to muscovite. The transition from V-rich phengite (oxidised) associated with ore to Ba-rich (reduced) muscovite implies that a redox gradient controlled the composition of white micas. Overlapping redox, pH and temperature gradients at KB are inferred to have influenced gold deposition.
•Chlorite FeOH absorption wavelengths indicate that Mg-chlorites are centred predominantly in the core of the hydrothermal cell. Fe-chlorites are zoned around the edges and along the D1 structures.
•The distribution of Mg- and Fe- chlorites represents a temperature gradient consistent with that depicted by white mica crystallinity.