Geoscience BC Map: 2015-13-01

KIMBERLEY GOLD TREND

Fort Steele Mining Division
Kootenay District

NTS Map Sheet: 082F, G, J, K

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Suggested reference:
Seabrook, M. and Höy, T. (2015): The Structural Controls of the Kimberley Gold Trend; Geoscience BC Map 2015-13-01, 1:200,000 scale.

LOCATION MAP

GEOLOGY

LAYERED ROCKS

WINDERMERE SUPERGROUP AND STRATAGRAPHICALY HIGHER FORMATIONS

Undivided layered rocks.

PURCELL SUPERGROUP Middle Proterozoic

DUTCH CREEK FORMATION

mPDc Undivided; green siltstone, argillite, stromatolitic dolomite and quartz wacke

NICOL CREEK, SHEPPARD, GATEWAY, PHILLIPS, ROOSVILLE FORMATIONS

mPNc Massive to amygdaloidal basalt to andesite lava flows, volcanic sandstone, siltite locally at base. Sandstone and conglomerate; dolomitic quartzite, sandstone, oolitic dolomite, stromatolitic dolomite at top.

VAN CREEK FORMATION

mPVc Pale green, laminated, siltite and argillaceous siltite and quartz wacke. Minor ripple marks, lenticular bedding, rare flattened mudcracks.

KITCHENER FORMATION

mPk Undivided; thin-bedded, brown weathering dolomite siltstone and green argillite.

CRESTON FORMATION

mPc Undivided sedimentary rocks. Light grey, mauve, green siltstone and argillite; thin- to medium bedded quartz arenite, quartz wacke. Lenticular bedding, ripples, cross-bedding and mudcracks.

ALDRIDGE FORMATION

mPA2 Middle and Upper: Grey to rusty weathering, thick- to thin-bedded, quartzofeldspathic wacke with argillite and siltite intercalations.

ALDRIDGE FORMATION

mPA1 Lower: Rusty brown weathering. thin- to medium-bedded, quartz wacke, quartz arenite.

FORT STEELE FORMATION

mPfs Rusty weathering thick-bedded white to grey quartzite.

INTRUSIVE ROCKS

McGREGOR/CORYELL INTRUSIONS - Eocene

TcS Volcanic dikes of alkalic syenite to shonkinite.

BAYONNE SUITE - Cretaceous

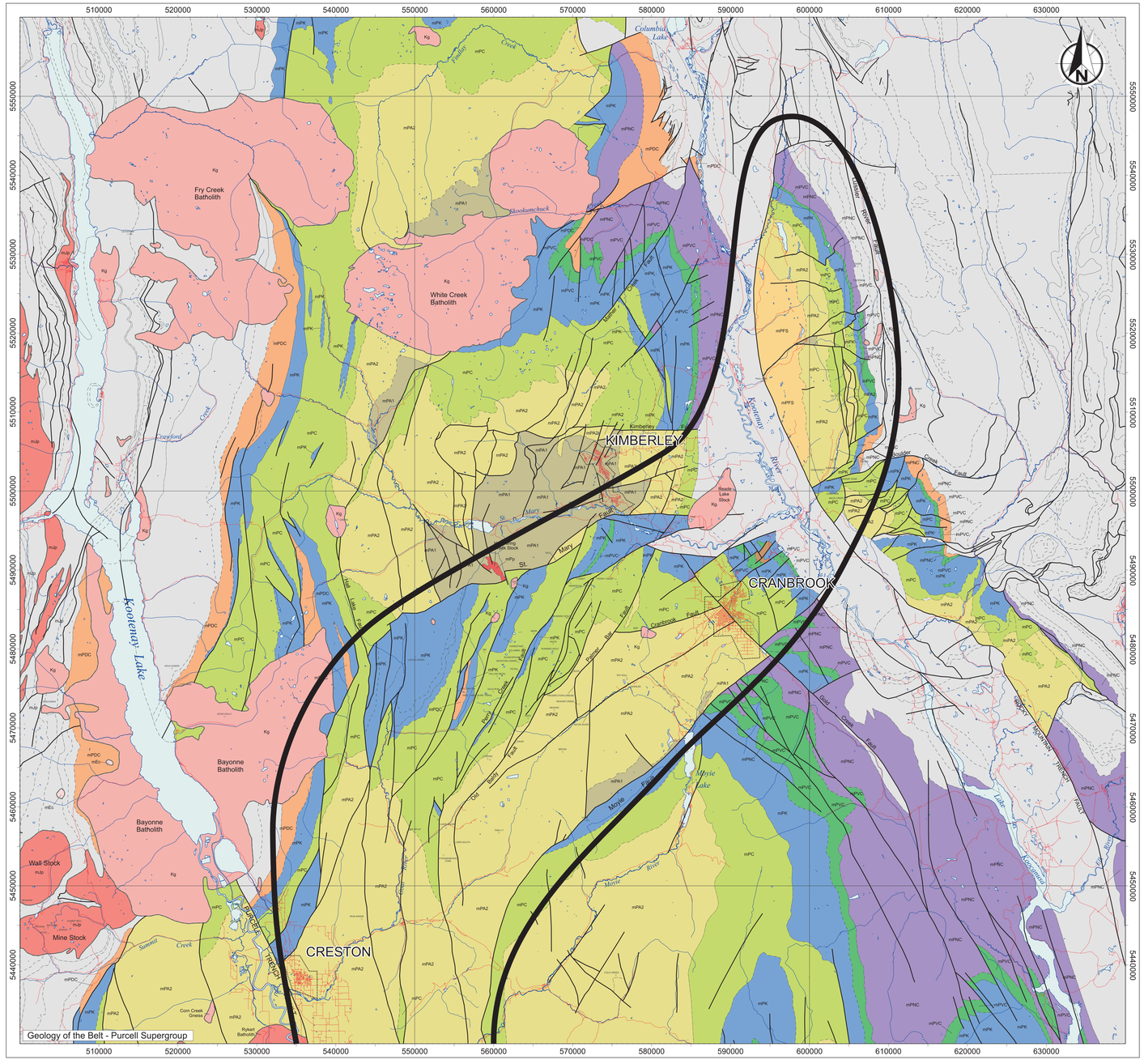
KBMS Granite and alkali feldspar granite

NELSON SUITE - Jurassic

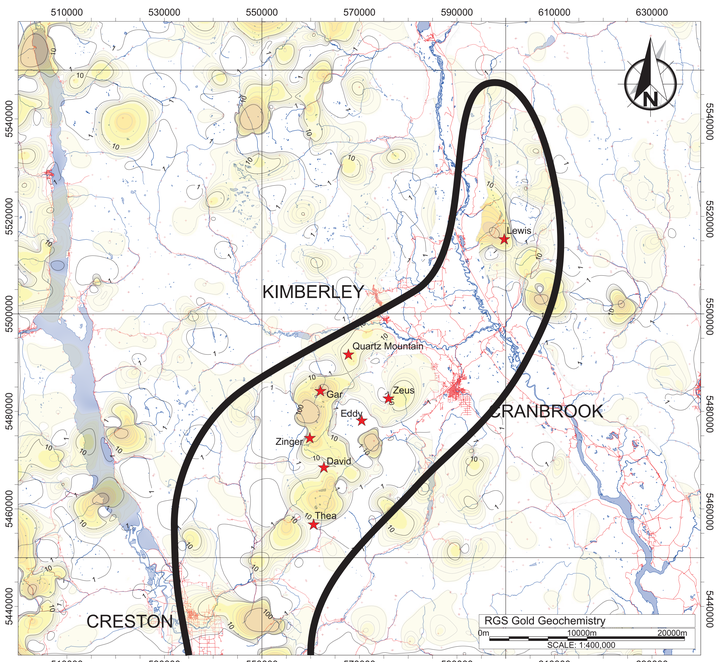
JNMS Porphyritic granite, quartz diorite, quartz monzonite, diorite, monzonite and syenite.

PROTEROZOIC INTRUSIONS - Middle Proterozoic

mPGP Light grey granitic pegmatite.



Adapted from:
Höy, T. (1993): Geology of the Purcell Supergroup in the Fernie West-half Map Area, Southeastern British Columbia; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Bulletin 84.



MAP SYMBOLS LEGEND

Gold properties
The Quartz Mtn., Eddy, and David properties were mapped in 2014
The Gar, Zeus, and Thea were visited in 2014
The Lewis and Zinger properties were mapped in previous years.

Gold as primary commodity Minfile locations (Geology Map)

Regional geochemical silt sample sites

REGIONAL GEOCHEMICAL SILT SAMPLING (RGS)

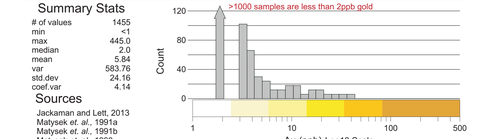
Summary Stats

# of values	1455
min	<1
max	445.0
median	2.0
mean	5.84
var	583.76
std.dev	24.16
coef.var	4.14

Sources

Jackaman and Lett, 2013
Matysek *et. al.*, 1991a
Matysek *et. al.*, 1991b
Matysek *et. al.*, 1990

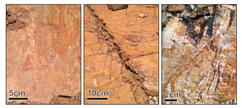
>1000 samples are less than 2ppb gold



STRUCTURAL CONTROLS

The structural controls to mineralization in the Kimberley Gold Trend were established through geological mapping, rock and soil geochemistry and to a lesser extent, geophysics. The structural features identified can be separated into two main groups categorized by their orientation, motion or relative displacement, vein mineralogy and character, and alteration composition. The two groups are named for their orientation; North to North-east trending oblique thrust faults called NE Shears and East to South-east trending normal faults and structural breaks called SE Breaks.

The NE Shears are the primary gold bearing structures in the Kimberley Gold Trend. They are sub-parallel to a regional northeast trending foliation attributed to the St. Mary fault and the Moyie fault which are the approximate bounding structures of the Kimberley Gold Trend. The amount of throw along the shears varies but the orientation of displacement is commonly right-lateral and reverse as determined by slickenside and other shear sense indicators. Gold occurs locally within these shears, concentrated in mineralized zones. Veining in the zones is highly variable ranging from thin, high-density, foliation parallel veins to bifurcating and anastomosing composites and intense breccias. The veins are composed of white quartz with weathered iron-carbonate and rare pyrite or other base metal sulphides. is A locally intense sericite, iron-carbonate and lesser Mn and silica alteration is associated with the veins. The zones range from a few square meters to several hundred meters in strike length. Some zones of intense alteration and veining along the NE Shears have no gold, whereas others have returned values of gold up to 57,000ppb from selective sampling (Klewchuk, 2004).



The SE Breaks are believed to be extensional structures oriented perpendicular to the axial plane of folds (or simply shear related extensions). The SE Breaks are synkinematic with the NE Shears and where discrete intersections have been observed, either structure can predate. Where movement can be determined along the Breaks it appears to be normal with minor lateral displacement. In some areas, almost pure extension is present and marker units and structures on either side of the fracture do not appear to be offset and here quartz has filled sizable fractures. Quartz veining that occurs within SE Breaks ranges from 1cm to 8m in width, pinching out along their strike. These veins can be en echelon, and as a set, oriented east-west. Within the veins are dominantly two minerals, chlorite plated along the margins of the veins and massive blebs of specularite up to 5cm in diameter that can extend across the vein width.

Alteration zoning commonly occurs along the veins with hematite proximal to the vein followed by a strong pervasive chlorite in the surrounding host rock. The zone of chlorite alteration can be so extensive that it may grade into the regional greenschist metamorphism.

A variation of the typical SE Break alteration may include albite-specularite-chlorite breccia, grading to albite-chlorite breccia, as observed on the Quartz Mountain property. A similar albite-chlorite zone was mapped on the Eddy property, and here the alteration was related to syenite. Of note, Soloviev (2010) hypothesized that the gold mineralization is closely associated with syenite intrusions, at least along a specific east-southeast trending zone near the Bar prospect.

The intersection of SE Breaks and NE Shears is the primary control on gold mineralization. Secondary controls are less well understood although important enough to note. Several gold prospects, including the Hill Vein, the Prospectors Dream, and the David, are hosted in a particular stratigraphic interval, between a set of gabbro sills that are commonly present in the middle part of the Middle Aldridge Formation. This stratigraphic horizon is known as the Sundown marker and is characterised by thinly laminated siltstone packages separated by turbidite siltstones and quartzites. The mixed layering competency may allow for shearing to take place along softer argillaceous beds, and for mineralized fractures to develop in the more competent quartzite beds. The mixed lithology also appears to be a control for gold emplacement in middle Creston Formation units. Interbedded thin argillites and quartzites in the Middle Creston commonly host more occurrences of mineralized zones than the surrounding thick quartzite packages as has been noted on the Zinger property (Seabrook and Höy, 2014). This suggests that a secondary control for gold mineralization in the Kimberley Gold Trend is the host rock composition of mixed soft and hard lithologies.

Lastly, (large and small scale) folds have been observed to host strong fracture mineralization that in many cases contain anomalous gold concentrations. In the Northern Hughes Range, a trend of rock and soil geochemistry samples are aligned along a large scale recumbent anticline known as the Lewis Creek anticline (Seabrook, 2013). Similarly, zones of strong 'M' folding and associated fracturing have been observed to host gold mineralization in the Zinger area. On the Zinger property, NE Shears and axial planes fold share a similar orientation but on the Eddy property, the two structural features have different strike orientations and intersect near mineralized occurrences (Hill Vein and Propector's Dream).

In summary, the dominant structural controls of gold mineralization in the Kimberley Gold Trend are:

1. North north-east trending right lateral thrusts that produce zones of composite quartz vein breccias and associated sericite-carbonate-sulphide and lesser manganese (pyrolusite?) alteration.
2. East south-east trending normal extensional faults and breaks with, en echelon bull quartz veins hosting chlorite and specularite. These structures have an associated pervasive hematite and chlorite alteration halo. In some cases an albite-specularite to albite-chlorite breccia occurs along this trend, and may have a relationship with syenite dikes and plugs.

Secondary controls that may lead to increased grade or size of gold deposits are:

1. Competency variations in host rock lithologies (composition of mixed soft and hard lithologies) that allow for shearing within soft units and vein filling fractures within harder units.
2. Fold hinge zones where increased fracture density may provide a suitable structural trap for mineralization.

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