PB-ZN-BA MINERALIZATION AT WILDS CREEK: RELEVANCE TO STRATABOUND DEPOSITS ALONG THE WESTERN PURCELL ANTICLINORIUM

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INTRODUCTION

The Wilds Creek deposit (Leg or Legion property) is one of a series of stratabound Pb-Zn-Ba prospects and mines in upper Belt-Purcell stratigraphy along the western edge of the Purcell Anticlinorium (Figure 1). These deposits are typically hosted in dolomitic units of the Dutch Creek Formation near the basal contact of the Mount Nelson Formation, although the stratigraphic nomenclature and correlation varies with different workers and requires a thorough review. The occurrences all lie in the hangingwall (west) of the Hall Lake fault. They have received various amounts of exploration attention and there is potential for large deposits, as shown by the Mineral King Mine located about 100 km north of Wilds Creek. It produced 1.334 million tons of 4.12% Zn, 1.76% Pb and 24.8 g/t Ag between 1956 and 1964 (Ministry of Mines, Annual Reports, 1956-1964). Mapping and drill core examination of the Wilds Creek property, about 12 km north-northwest of Creston, suggest characteristics that are of exploration significance for this part of the Belt Basin. The study is a component of a regional mapping program by the B.C. Geological Survey (Brown and Stinson, in prep.).

Galena and sphalerite were originally discovered in Wilds Creek in 1924. The showing was drilled by Newmont Mining Corporation (1954 - 6 holes), Sheep Creek Gold Mines (1961 - 2 holes), Aspen Grove Copper Mines (1964 - 5 holes), Legion Resources Ltd. (1989 - 7 holes), Kokanee Exploration Ltd. (1990 - 5 holes; 1992 - 9 holes) and Ramrod Exploration (1992 - 9 holes). There has been over 4,667 metres of drilling, excluding the 1964 program. Estimated reserves were reported at about 150,000 tons grading 6% Zn across 1 to 6 metres (Aho, 1964).

STRATIGRAPHY

The property stratigraphy comprises nine, poorly exposed units (from east to west; Figure 2): (1) sericitic phyllite (Creston Formation); (2) thin bedded black argillite and tan dolomitic siltstone (Kitchener Formation); (3) chlorite-sericite phyllite with prominent but minor light grey quartzite beds; (4) argillite and dolomitic siltstone; (5) mineralized phyllitic dolomite and dolomitic siltstone; (6) dark grey phyllitic argillite and siltstone; (7) dolomite and limestone hosting the Pb-Zn-Ba mineralization (Dutch Creek ? Formation); (8) mafic volcanic rocks (Nicol Creek ? Formation); and (9) quartzite (Mt. Nelson ? Formation). Most units are phyllitic and internally tightly folded although unit contacts are not recognizably folded. Correlation of these units with the regional stratigraphic column remains a problem and should be considered tentative. Below are summary descriptions of the main units bounding the ore, the deposit structure and characteristics of the mineralization.

Two sequences of layered dolomite and impure quartzose dolomite (units 5 and 7) host banded sulphide and are of prime economic interest. The eastern dolomite (unit 4) is more silicic and thinner than the recessive and poorly exposed white to cream coloured dolomitic siltstone of unit 7 (at least 70 metres thick). Distinctive dolomite and limestone breccia within the western dolomite horizon (unit 7) forms an important marker unit found in most of the other properties listed below. It contains angular argillite fragments and subrounded quartz and dolomite clasts up to 10 cm long. The matrix-supported argillite fragments weather out and contribute to the permeable character of this unit that now acts as an aquifer. Quartz fragments appear to be pieces of broken white quartz veins, perhaps derived from early diagenetic veins. The breccia is thought to be a solution collapse (karst) deposit and may correlate with breccias at the Mineral King Mine, described by Pope (1989), at Mt. Bohan (D. Anderson, pers. com., 1994) and at LaFrance Creek (Dave Wiklund, pers. com., 1994).

A volcanic succession (unit 8) including pillow lavas and associated tuff are exposed along a new logging road north of the mineralized dolomite. The pillows are up to 1 m long with chloritic selvages and locally with plagioclase porphyritic cores and amygdales. The brown weathering, medium to fine-grained flows are dark green on fresh surfaces, and locally have oxidized flow tops. Tuffs are deeply weathered, olive green to brown and friable. The 750 metre thick section is dominated by reeessive tuff and capped by about 75 metres of flows. The volcanic unit pinches out to the south as 1 to 10 metre thick sills and rare flows within dolomitic and siliciclastic rocks . The recent recognition of these volcanic rocks is critical for regional correlation as a western equivalent of the Nicol Creek Formation.

An unmineralized, resistant, massive to thin bedded quartzite and quartz-muscovite phyllite (unit 9) forms the western edge of the property. Bedding dips fairly consistently and steeply to the southeast. The fine to medium-grained well foliated quartzite ranges from white to grey to pale green. Some layers are more chloritic and probably represent argillaceous interbeds. The quartzitic succession probably correlates with the base of the Mount Nelson Formation (Reesor, 1983) and has been interpreted to unconformably overlie the Dutch Creek Formation in the Toby-Horsethief creek area to the north (Pope, 1989).

A granitic stock, 500 m wide and 1500 m long, lies immediately west of the lower reaches of Wilds Creek. The massive biotite granite is related to the Cretaceous Bayonne Batholith that crops out farther to the northwest. Calc-silicate assemblages including coarse tremolite and biotite hornfels are prominent in the southwestern part of the property. Regional aeromagnetic data show that anomalously high values extend southward from the Bayonne Batholith under the entire property.

STRUCTURE

The Wilds Creek area lies on the northwest limb of the Goat River anticlinorium (Brown et al., 1994) with a homoclinal succession from Creston Formation to Mount Nelson Formation. However, the details are more complicated and are currently being evaluated. On the property bedding and penetrative phyllitic chlorite-sericite foliations strike north-northwest and dip steeply to the east (also locally to the west). The southeast dips and apparent northwest facing direction suggest the stratigraphic succession is slightly overturned. Much of the structural style is controlled by competency contrasts of the different lithologies, tight chevron folds are abundant in the sericitic phyllite (Unit 3) and transposed bedding is common in argillite units. The mineralized carbonate (Unit 7) is phyllitic but the enclosed carbonate breccia displays no tectonic fabric, perhaps due to local flow of the carbonate unit along its contacts.

MINERALIZATION

Two separate carbonate horizons host different styles of mineralization. The "Main Zone" comprises two zones of stratiform, fine-grained, honey-coloured sphalerite and minor galena hosted in pyritic silicic dolomite (Unit 7). Baritic dolomite is important in this horizon, 1.3 metres of bedded barite is reported farther north, near LaFrance Creek (Dave Wiklund, pers. com., 1994). The "East Zone" consists of dolomite-hosted fracture controlled chalcopyrite-sphalerite-pyrite within unit 5. Recent drilling has concentrated on the Main Zone (Figure 2). The Main Zone is at least 300 metres long and 2 to 3 metres wide, extending northward from Highway 3A to about 1250 metres elevation and lies within the western dolomitic horizon (Unit 7). Bedding parallel medium to fine grained pale sphalerite (up to 10%) and pyrite with rare galena occur within laminated dolomitic limestone and calcareous quartzite and argillite. This layering may be a primary texture. On surface in Wilds Creek the zone is intensely oxidized. Mineralization is banded in the south and becomes more silicified and massive to the north (Giroux, 1990). The East Zone is more intensely silicified than the Main Zone with abundant quartz veinlets and stockwork hosted within an eastern dolomitic horizon (Unit 5). It comprises pyrite with sporadic tetrahedrite, galena, sphalerite and chalcopyrite.

PRELIMINARY MODEL

The deposit contains stratabound Zn-Pb-Ba hosted within dolomite adjacent to mafic flows and tuffs that thicken rapidly to the north. The rapid change in the thickness of the mafic volcanic rocks is interpreted to be controlled by syn-volcanic growth faults developed during rifting. Synvolcanic block faulting synchronous with dolomite deposition would provide a heat source and conduits for the development of a hydrothermal system that could have produeed the Pb-Zn-Ba mineralization at Wilds Creek. A rift-setting during extrusion of the Nicol Creek Formation farther to the east has been documented by Hoy (1993). The Roo Cu-Co-Ag prospect near Roosville (NTS 82G), a stratiform redbed copper showing above the Nicol Creek lavas may have formed in a similar setting.

CONCLUSIONS

Potentially similar prospects along the western edge of the Purcell anticlinorium include Mt. Bohan (Hall Property), LaFrance Creek (Wall and Dave claims), Mineral King and Paradise Mine (Figure 1). The latter two are interpreted by Pope (1989) to be manto deposits. Exploration activity continues at many of these properties.

The exploration model for the Wilds Creek deposit can be summarized as follows.

- Stratigraphic interval: Dutch Creek - Mount Nelson contact
- Local setting: association with silty dolomite, baritic dolomite and bedded barite (near LaFrance Creek) that contains a carbonate breccia unit (possible karst?);

abrupt thickening of mafic volcanic rocks (Nicol Creek Formation?).

- Mineralization: stratabound sphalerite, galena; dolomite and barite gangue.
- Geochemical expression: strong Pb-Zn-Ba soil anomalies.
- Geophysiaal expression: spatial association with magnetic mafic volcanic rocks (flows and sills).

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FIGURE CAPTIONS:

Figure 1. General location of stratabound Pb-Zn-Ba deposits and occurrences along the western flank of the Purcell Anticlinorium. Inset map illustrates the position relative to the Belt/Purcell Basin. HLF = Hall Lake fault, MF = Moyie fault, PT = Purcell Trench fault, RMT = Rocky Mountain Trench, SMF = St. Mary fault.

Figure 2. Generalized geology of the Wilds Creek (Leg) Property.

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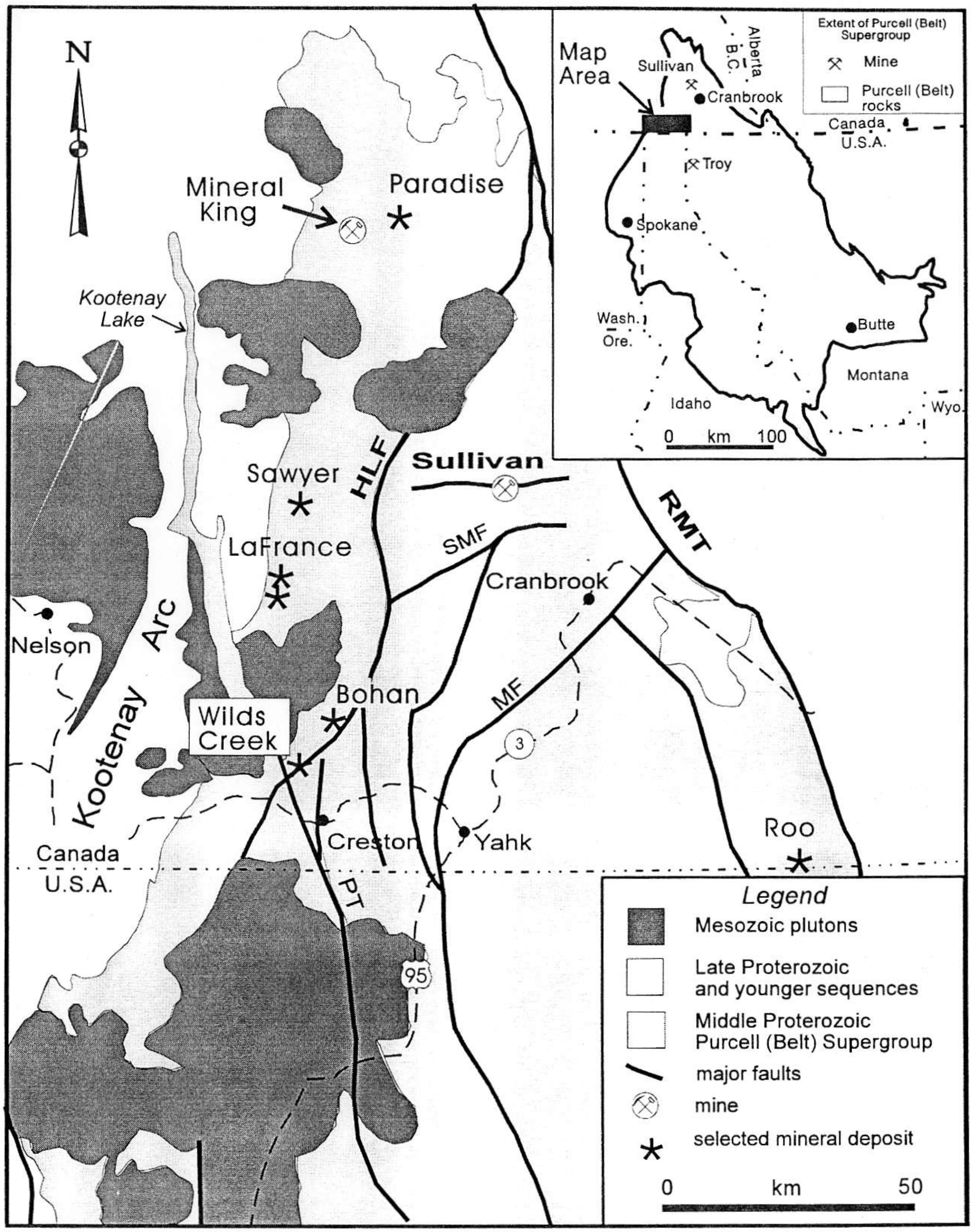

Figure 1.

Leg1.cdr

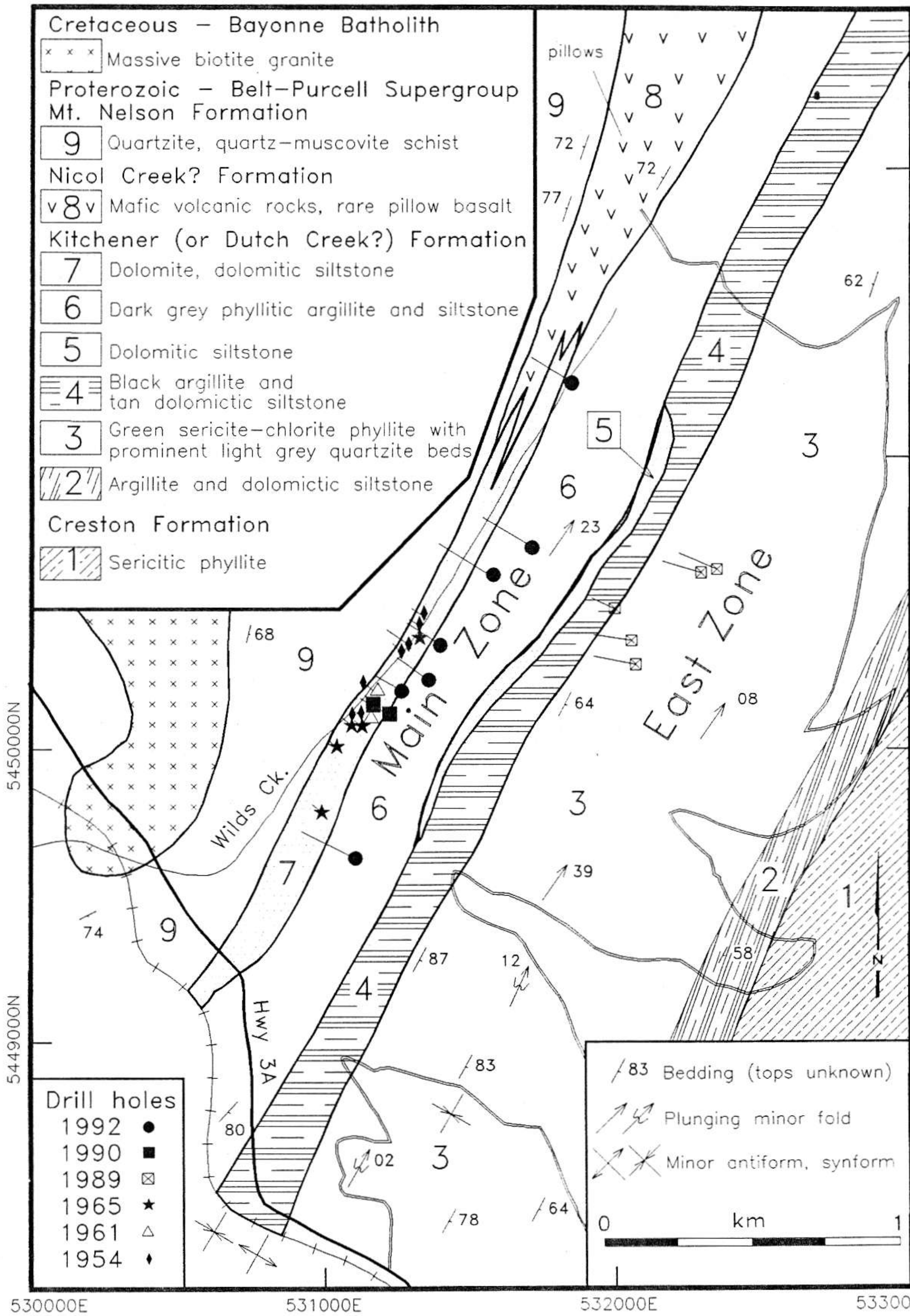

Figure 2. Generalized geology of the Wilds Creek Property.

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