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AGE OF MINERALIZATION, CITY OF PARIS VEINS, GREENWOOD AREA (82E/2E)

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INTRODUCTION

This report is an update on the age of the City of Paris vein system on the Lexington property, Greenwood mining camp, south central British Columbia (Figure 1). The Greenwood camp is located at the north end of the Republic graben, one of a number of Tertiary grabens in southern British Columbia and northern Washington State which have associated precious metal vein mineralization. For example, the Knob Hill mine at Republic, Washington, exploits a significant gold-silver deposit associated with Tertiary faulting and related structures (Lasmanis, 1996). Similar occurrences in British Columbia include the Brett and Dusty Mac mines in the Okanagan area, and the Picture Rock and Tam 'O Shanter occurrences near Greenwood (Meyers, 1988; Church, 1973, 1986 and 1996).

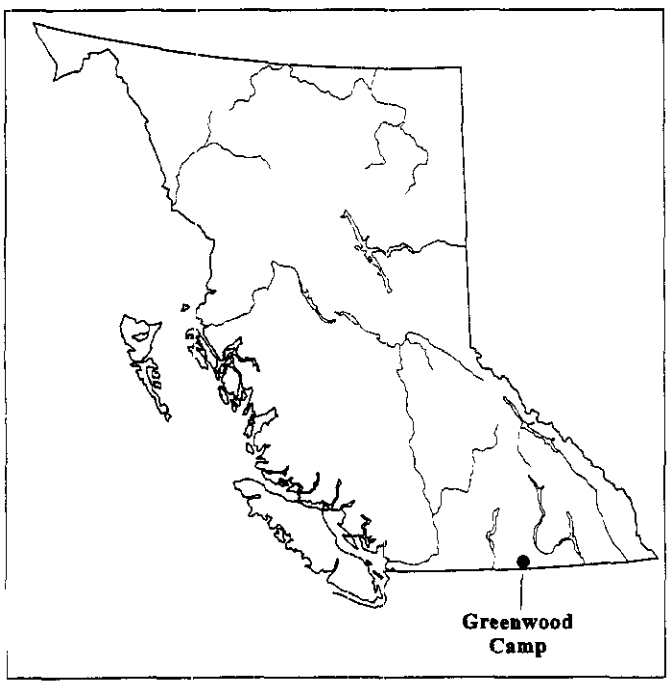

Figure 1. Location Map, Greenwood camp

Exploration on the Lexington property in the Greenwood area first focussed on the gold and silver-bearing quartz veins and stockworks associated with the Lexington quartz porphyry and serpentinite. At the turn of the century, workers at the City of Paris mine developed a system of discontinuous quartz veins extending for about 400 metres along the upper contact of the Lexington intrusion and in the overlying serpentinite. At this time the City of Paris mine yielded 1639 tonnes of ore grading 13.7 grams per tonne gold, 71 grams per tonne silver and 3.12 per cent copper. Porphyry-style mineralization, similar to the nearby Lone Star mine in Washington State, is the subject of ongoing development by Britannia Gold Corporation and Bren-Mar Resources Ltd. (Seraphim *et al.*, 1996).

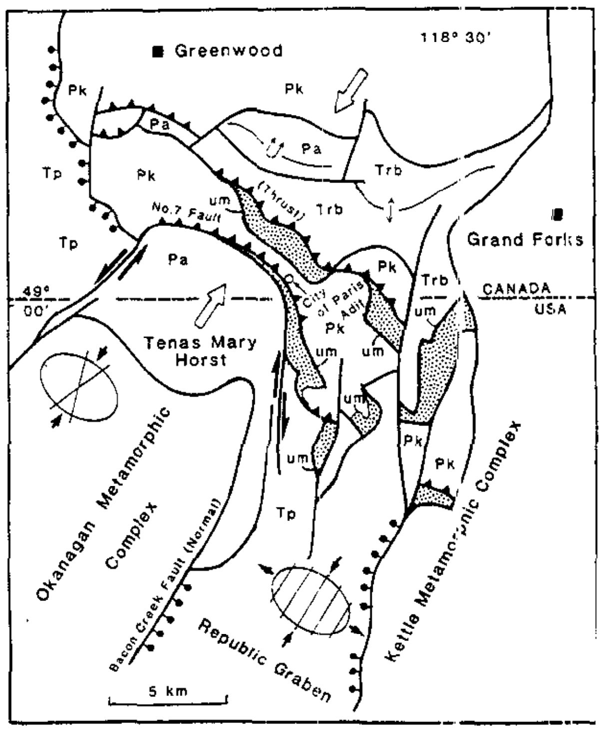

Figure 2. Geology of the Greenwood - Boundary area after Cheney *et al.* (1994), Fyles (1990) and Church (1986), showing interpretation of late Cretaceous-early Tertiary stress fields (ellipsoids); Tp - Penticton Group (Eocene); Trb - Brooklyn Group (Triassic); Pa - Attwood Group (Permian); Pk - Knob Hill Group (Paleozoic); um - ultramafic rocks.

GEOLOGICAL SETTING

The City of Paris vein system is associated with the No. 7 fault zone and a belt of serpentinite that traverses the Lexington property on the Canada - United States border (Little, 1983). The fault zone is an ancient structure believed to be a possible continuation of the Chesaw thrust in Washington State (Cheney *et al.*, 1994).

The serpentinite is a disrupted Paleozoic ophiolite composed primarily of peridotite with zones of talc and listwanite (Fyles, 1990). Because of the ductile nature of these rocks, the belt has become a tectonically active zone and the locus of much shearing, thrusting, igneous intrusion and vein mineralization. The common Mg-Fe carbonate (listwanite) alteration and serpentinization are believed to be related to major thrusting of the ophiolitic rocks during the Jurassic (Monger *et al.*, 1982). In the early Tertiary these thrusts were re-activated by a tectonic compression directed subparallel to the developing northerly elongated graben structures (Church, 1986 page 32). Igneous activity at the same time is believed to be related to numerous vein deposits. Carr et al (1987) interpreted the age of onset of extension (and overlapping compression) in the southern Interior of British Columbia as 58 Ma (early Eocene). The event is linked to interaction between the North American and the subducting Kula - Pacific plate boundaries (Struik, 1992).

Figure 2 proposes an early Tertiary northerly directed stress scheme (ellipsoids and arrows) to explain the apparent lateral movement of the Tenas Mary Horst and corresponding thrusting and tensional structures related to the Republic graben.

The City of Paris mine is on a vein system near the south contact of a major ultramafic lens (Church, 1971). The vein system consists of two locally discontinuous, subparallel veins developed along the margin of a narrow serpentinite appendage flanking the main ultramafic body. The veins trend NW at about 160° and vary in width from 5 metres to mere stringers of ore (Photo 1). The vein system dips 55° degrees northeast and has an exposed strike length of 460 metres. The City of Paris vein, which follows the northeast side of the serpentinite appendage, is the source of much of the mined ore. The Lincoln vein occurs on the south side of the serpentinite appendage. This is explored by the main northwest trending drift on the adit level.

The workings of the City of Paris mine were first described by Brock (1903, p.124A):

"From the northwest drift along the lead, four cross cuts have been run 90 feet. The rock traversed by them is impregnated with and traversed by stringers of quartz and calcite carrying sulphides, which diminish in amount with distance from the main lead. In one cross cut an ore body was encountered running SW, diagonal to the main lead. The ore occurs in chutes. A dark dyke occurs in the mine with ore following it on each side.

"The ore on the northwest drift consists of argentiferous galena, blende, tetrahedrite, chalcopyrite and pyrite, while on the southeast drift the ore is almost massive pyrite and chalcopyrite........."

Some of the best assay results were obtained from the Lincoln shaft and portal area. The metal values are unevenly distributed, running in pay streaks. A grab sample from the vein near the Lincoln shaft assayed 2.1 grams per tonne gold, 182 grams per tonne silver, 1.84 per cent copper, 3.98 per cent lead, 0.12 per cent zinc, 0.073 per cent arsenic, and 0.93 per cent antimony (Church, 1971). The tetrahedrite gave very high assay values (Photo 2).

Photo 1. Quartz veinlets in serpentinite, No.7 Fault Zone, City of Paris mine area

The origin of the vein system is related to reactivation of thrusting at the contact between the Lexington quartz porphyry and hangingwall serpentinite during the development of the Republic graben. The veins clearly existed prior to emplacement of many of the Tertiary dikes, as evidenced by the damming of these dikes adjacent to the veins. However, the veins are also younger than the penetrative deformation that is commonly seen in the surrounding country rocks. An analysis of fuchsite obtained from quartz stringers in listwanite, immediately north of the Lincoln workings, yielded a K/Ar age of 56.7 ±1.0 Ma (see Table 1).

Table 1

Radiometric Date for Fuchsite

Latitude	49^{O} 00.6'
Longitude	118^{O} 36.5'
K%	4.237 ± 0.020
Ar^{40}	9.489 X 10^{-6} cc/gm
% Ar^{40}	90.1
Ma	56.7 ± 1.0

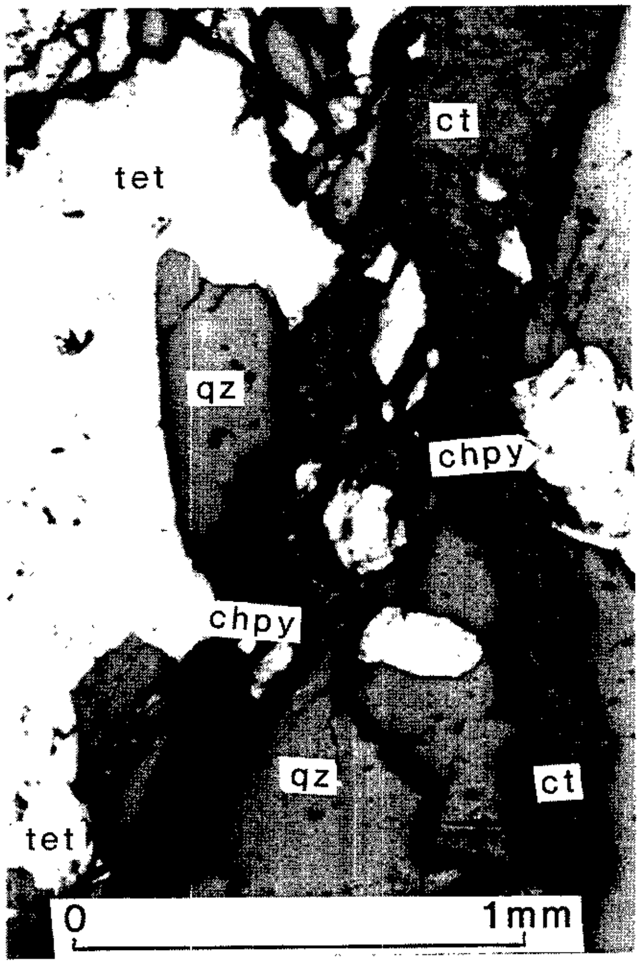

Photo 2. Photomicrograph of Quartz vein ('qz') with islands of chalcopyrite ('chpy' - light grey) in tetrahedrite ('tet' - medium grey) flanked (on right) by calcite gangue ('ct')

DISCUSSION

Theories regarding the genesis of the City of Paris mineralization generally involve faulting and the Lexington intrusion, which was emplaced in the early Jurassic. The serpentinite in the Lexington area was emplaced first, as a ductile body into the northeast dipping No. 7 fault zone. Later, the Lexington magma, in one or several pulses, intruded the same fault zone dividing the serpentine into upper and lower limbs. The Lexington intrusion was emplaced in the early Jurassic, near the time of accretion of Quesnellia to the North American plate; the parental magma was contaminated by, or derived from, early Proterozoic rocks (Church, 1992). This was accompanied by a pulse of copper-gold porphyry type mineralization. Continued movement on the fault zone resulted in penetrative deformation of the serpentinite and the Lexington quartz porphyry that made the contacts between these units locally indistinct. Later movement fractured the margins of the intrusion allowing emplacement of the City of Paris vein system (early Eocene) which was then sheared by still younger movement. Relatively fresh and undeformed dikes, thought to be related to the tensional fissures of the Republic graben, that cross-cut the porphyry mineralization but not the vein system.

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