# MINERAL RESOURCES: INTERIOR PLATEAU PROJECT (93F/3 and parts of 93F/2, 6 & 7)

By T.G. Schroeter and R.A. Lane

*KEYWORDS:* Economic geology, Interior Plateau, Hazelton Group, Ootsa Lake Group, epithermal, transitional, stratabound, porphyry Mo-Cu, skarn, landsat imagery.

## INTRODUCTION

The Interior Plateau physiographic region of central British Columbia extends in a northwesterly trending direction for over 400 kilometres. The area covers 93F/3 and parts of 93F/2, 93F/6 and 93F/7, approximately 110 kilometres southwest of Vanderhoof. Access is by Forest Service roads from Vanderhoof, where the Kluskus road, together with the Van-Tine spur road and mining roads, provide access to the Wolf, Paw, Fawn, Capoose, Buck and Blackwater-Davidson properties (Figure 1).

The northwestern region of the plateau is the focus for this assessment of economic potential for base and precious metal deposits in Lower to Middle Jurassic (Hazelton Group) and Tertiary (Ootsa Lake Group) volcanic and volcaniclastic rocks and associated intrusive rocks (*e.g.*, Cretaceous Capoose batholith).

In general, the region has similarities to the Basin and Range structural province in Nevada (extensional block faulting). Furthermore, the Babine area, to the northwest, which is separated from the Interior Plateau by the Skeena Arch, has a similar structural style.

To date the mineral deposits component of the Interior Plateau project has concentrated on the evaluation, description and classification of a variety of deposit types in the study area. Particular attention was paid to host-rock lithologies, controls to mineralization, metallic and gangue mineralogy, timing of events and the relationship of mineralization to structure and plutonism. In the past, mineral exploration in the area has been hampered by: abundance of glacial drift cover, extensive cover of Neogene lava flows, relatively poor access, an obsolete geological database, and the lack of modern geophysical or geochemical survey data. Most of the area remains unstaked.

Epithermal, transitional, skarn, porphyry and stratabound (?) styles of mineralization have been identified and are described in this paper.

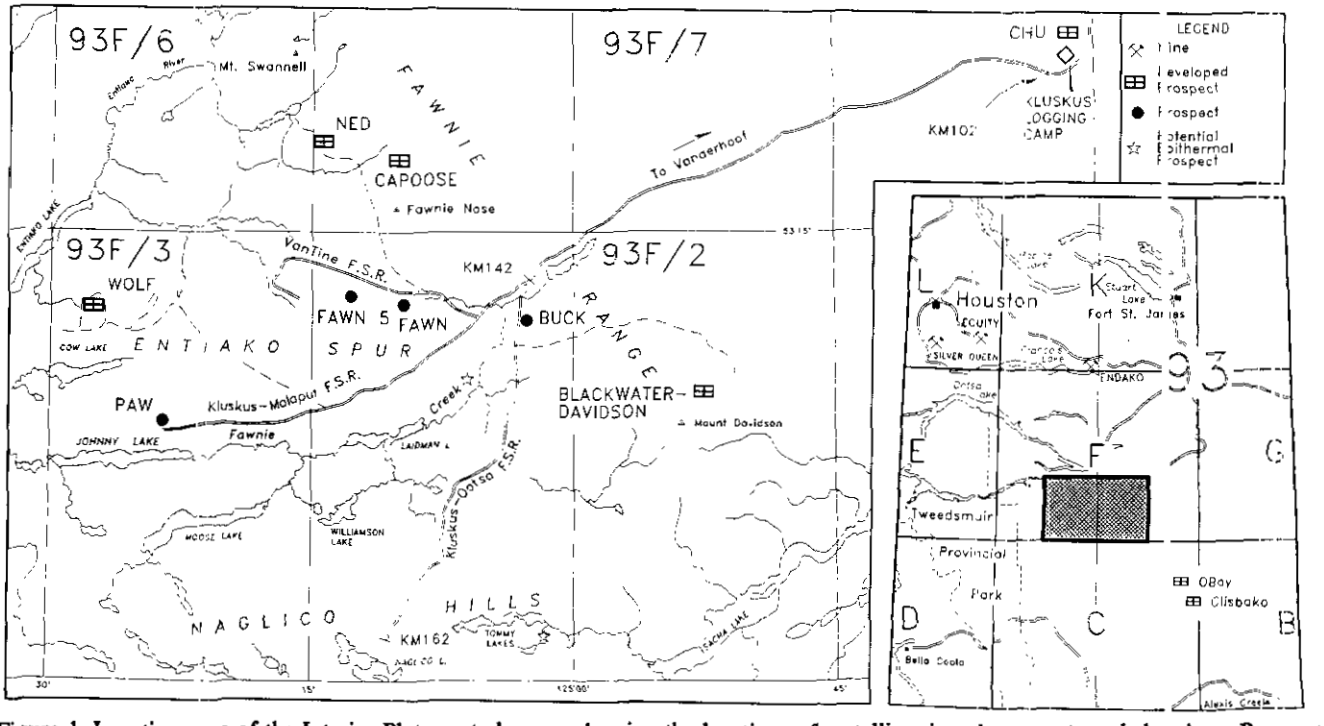


Figure 1. Location map of the Interior Plateau study area, showing the locations of metallic mineral prospects and showings. Prospects (boxes) and showings (dots) discussed in the text are located. Two new epithermal alteration zones (stars) were discovered during regional mapping (Diakow and Webster, 1994, this volume). Two operating mines, Equity Silver and Endako, as well as two epithermal prospects, Oboy and Clisbako, located outside the current field area, are shown for reference. Forest Service roads are shown as solid bold lines and four-wheel-drive roads are shown as dashed lines.

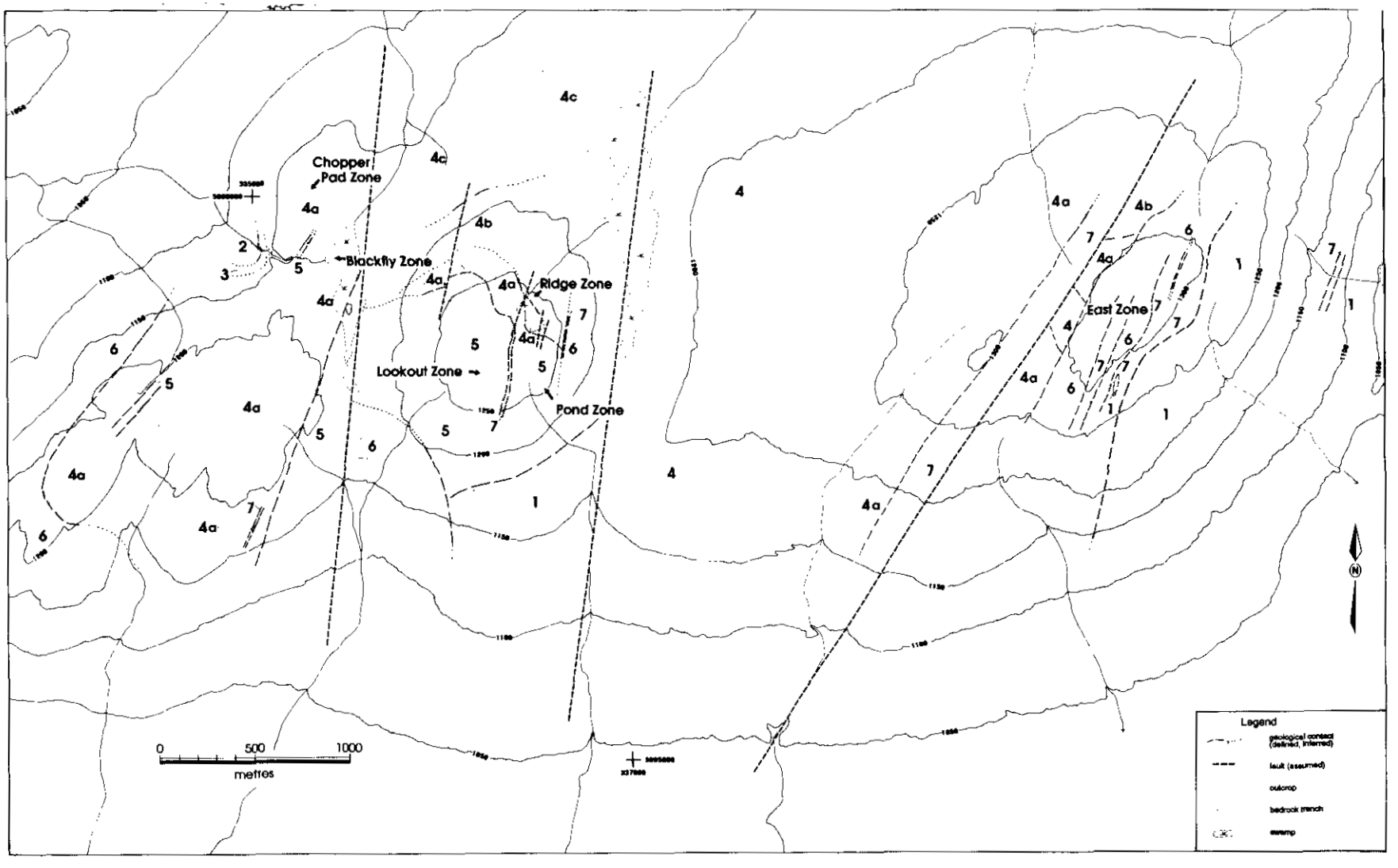


Figure 2. Simplified geological map of the central part of the Wolf epithermal gold-silver deposit and location of anomalous zones. Legend: **Jurassic Hazelton Group**, 1 = pyroxene-phyric andesite flows and minor argillaceous interbedded mudstones, siltstones and sandstones. **Tertiary Ootsa Lake Group**, 2 = basal(?) polymictic conglomerate; 3 = intermediate lapilli tuff; 4 = rhyolite package (4a = proximal rhyolite flows, tuffs and breccias; 4b = tuffaceous siltstones and mustones, 4c = distal ignimbrites, densely welded to non-welded); 5 = maroon quartz feldspar porphyry; 6 = grey feldspar porphyry; 7 = quartz eye porphyry.

## EPITHERMAL DEPOSITS

Two epithermal precious metal prospects (Wolf and Fawn), hosted by Tertiary rhyolitic volcanic and related hypabyssal rocks and by Lower to Middle Jurassic Hazelton Group intermediate to acidic volcanic and volcaniclastic rocks respectively, are described in this paper. Two new epithermal prospects were discovered during the course of regional mapping at a scale of 1:50 000 (Diakow and Webster, 1994, this volume).

There is potential for both high-grade bonanza (*e.g.*, Blackdome; Republic, Washington; Sleeper, Nevada) and bulk-mineable (*e.g.*, Round Mountain, Nevada) deposits.

### *WOLF [MINFILE 093F 045]*

The Wolf prospect is a low-sulphidation, adularia-sericite epithermal gold-silver deposit hosted by Upper Cretaceous to Oligocene Ootsa Lake Group sedimentary, rhyolitic volcanic and genetically related hypabyssal rocks. The property is approximately 130 kilometres southwest of Vanderhoof and consists of 198 mineral claim units in a 13 claim blocks between Cow Lake to the south and Entiako Lake to the northwest (Figure 1). The claims were originally staked in 1983 to cover prominant knobs of hydrothermally altered felsic volcanic rocks that crop out east of a silver-zinc-arsenic-molybdenum lake-sediment anomaly. The property is currently being explored by Metall Mining Corporation under option from Lucero Resource Corporation.

Remnants of a possible flow-dome complex form three areas of prominent relief extending from west to east across the property (Figure 2). These three resistant features are separated by northerly trending extensional faults that down-drop fault blocks toward the west. The Ootsa Lake Group at Wolf consists of the following sequence of rocks. A basal(?) polymictic boulder conglomerate rests unconformably on a basement of Jurassic Hazelton Group epiclastic sedimentary rocks and pyroxene-phyric andesite flows. Pale green vitric and lapilli tuffs, tuff breccias and tuffaceous siltstones conformably overlie the conglomerate. Tuffaceous rocks are in turn conformably overlain by rhyolite flows and autoclastic breccias (proximal), ignimbrites (distal) and rhyolitic tuffs. These are intruded by quartz-eye rhyolite that may, in part, be equivalent to the extrusive rocks. Grey feldspar porphyry and maroon quartz feldspar porphyry sills and dikes (also possible feeders to eroded Ootsa Lake rhyolites) intrude the volcanic pile. Late quartz-eye porphyry dikes cut all other rock types.

A Middle Eocene age of between 47.6±1.7 and 49.9±1.7 Ma has been established for rhyolite flows and felsic intrusives using K-Ar dating methods (Andrew, 1988). Wolf volcanic rocks are subalkaline with a high-potassium calcalkaline affinity and are dominantly hypersthene-corundum normative (Andrew, 1988). The rhyolite package may represent a felsic volcanic centre in, or along, the margin of a resurgent caldera complex.

Mineralization and alteration are structurally controlled. Mineralization occurs in northerly trending quartz (carbonate) veins (Lookout and Pond zones), siliceous stockworks (Blackfly, Chopper Pad and East zones) and hydrothermal breccia zones (Ridge zone), and as a stratabound unit of pervasively silicified and brecciated rhyolite and tuffaceous sediments (Ridge zone) capped by a maroon quartz feldspar porphyry sill (Plate 1). Chalcedonic colloform banding (Plate 2), comb structures and drusy cavities are typical; bladed quartz textures, silica replacement of original calcite or barite (Plate 3), indicate that boiling occurred during the evolution of a high-level, epithermal system.

Sulphide mineralization is only weakly developed; very fine grained disseminated pyrite never exceeds 0.5% of the rock by volume. Traces of fine-grained chalcopyrite are rare. Other metallic minerals include micron-sized electrum, native silver, aguilarite ($Ag_4SeS$), naumannite ($Ag_2Se$), acanthite ($Ag_2S$), digenite ($Cu_9S_5$) and galena (Andrew, 1988). Soil and rock geochemistry show there is generally a lack of arsenic, antimony and mercury in the mineralized system. However, anomalous arsenic and mercury values occur at the Blackfly zone.

The highest grades of mineralization appear to occur in zones that have undergone repeated episodes of brecciation and silicification. Better gold grades are associated with grey to brown, banded chalcedonic silica and very fine grained disseminated pyrite (Plate 4). The most encouraging results to date have been at the Ridge zone where trenching across the zone yielded 8.49 grams per tonne gold and 42.21 grams per tonne silver over 7.5 metres (Cann, 1984). Another trench across the zone returned assays of 2.69 grams per tonne gold and 14 grams per tonne silver over 26.5 metres (D.R. Heberlein, personal communication, 1993). Diamond drilling by Minnova in 1992, before it was taken over by Metall Mining, outlined a zone of continuous mineralization with a minimum strike length of 300 metres, down-dip extension of at least 270 metres and true thickness of at out 7 metres. The best drill intersection (ddh WF-92-10) through the zone assayed 2.32 grams per tonne gold over 9.1 metres (D.R. Heberlein, personal communication, 1993).

Alteration on the property is characterized by moderate to intense silica replacement of permeable horizons in tuffaceous rhyolitic rocks. At the contact between rhyolite and the maroon quartz feldspar porphyry sill both rock types have been wholly replaced by white sugary quartz. The sill may have acted as an impermeable cap to ascending silica-rich hydrothermal fluids. Below this zone of intense silicification is a well developed multistage hydrothermal breccia that is weakly to moderately silicified (Plate 5). Some of the breccia clasts have been replaced by clay minerals. Areas of silicification are generally flanked by zones of argillic alteration that are particularly well-developed in porphyritic intrusions adjacent to faults where megacrystic plagioclase phenocrysts are replaced by clay. Clay mineralogy consists dominantly of kaolinite and lesser illite and montmorillonite (Andrew, 1988). Adularia has been identified, but is not common (D.R. Heberlein, personal communication

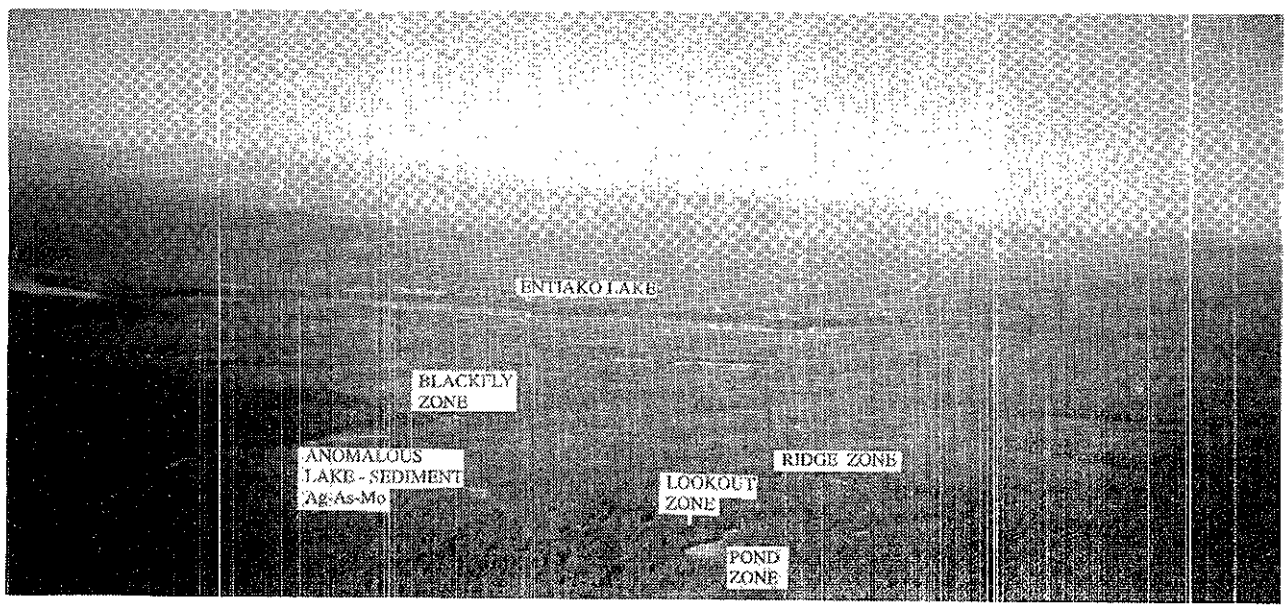


Plate 1. Looking north over the Wolf property. (Photo by K. Pride.)

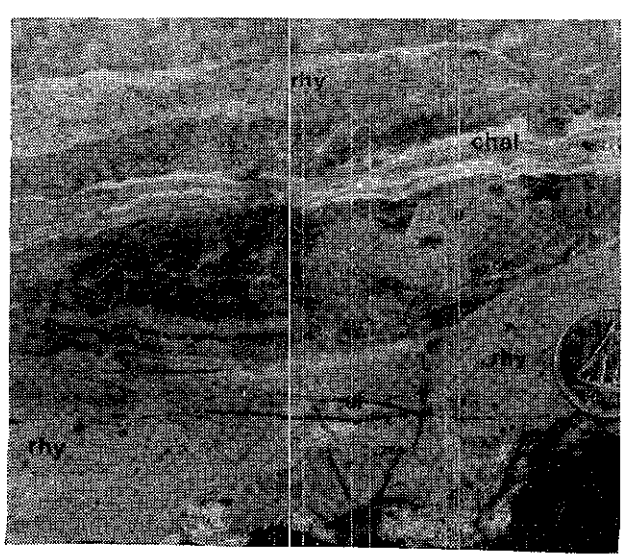


Plate 2. Banded chalcedonic quartz vein silicified quartz-phyric rhyolite, Ridge zone, Wolf property.

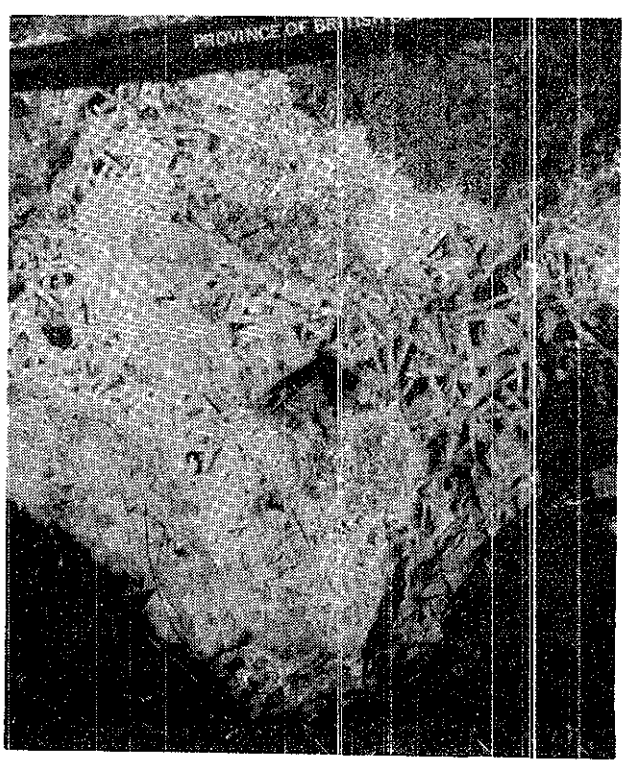

Plate 3. Bladed silica (after barite or calcite, indicative that boiling has occurred) in quartz-phyric rhyolite, Ridge zone, Wolf property.

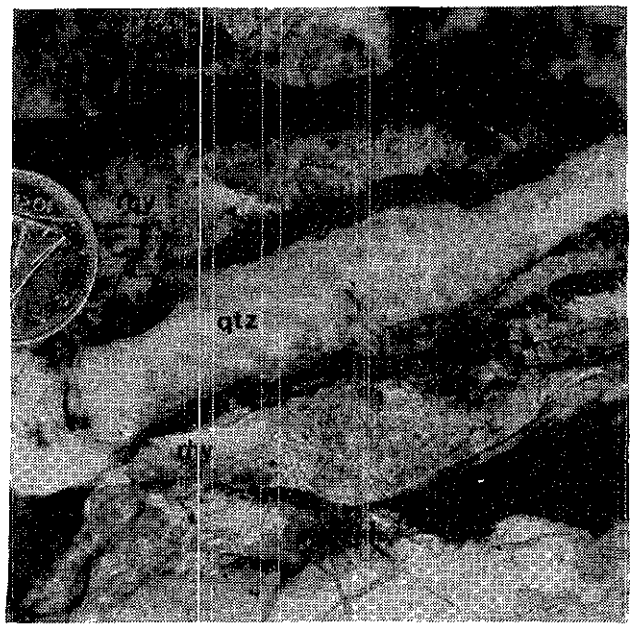


Plate 4. Banded quartz vein with dark grey (sulphide/sulphosalt/electrum?) borders in brecciated quartz-phyric rhyolite, Ridge zone, Wolf property.

Plate 5. Banded chalcedonic quartz veinlets in mineralized breccia, Ridge zone, Wolf property.

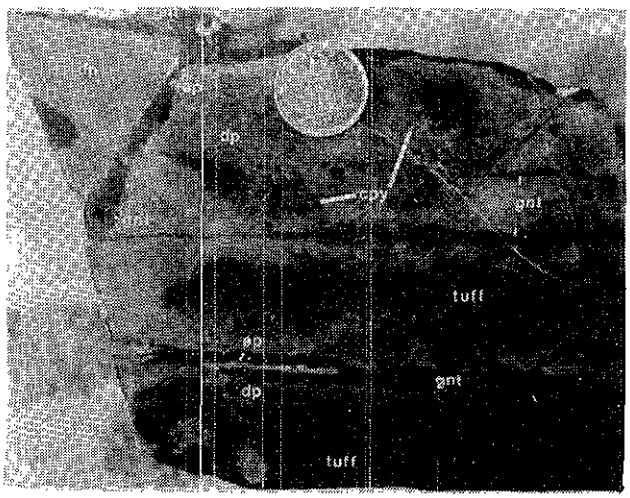


Plate 6. Diopside-garnet-epidote exoskarn with fragments of Hazelton Group crystal tuff, Fawn property.

1993). Clays, sericite, chlorite and minor secondary potassium feldspar occur as narrow alteration envelopes along the walls of sharply defined quartz (carbonate) veins. Manganese oxide commonly lines fractures; iron oxide staining and Liesagang rings occur locally.

The potential for future discoveries and continuing exploration success at the Wolf prospect is considered to be excellent.

## *FAWN (GRAN) [MINFILE 093F 043]*

The Fawn prospect is located on the eastern end of Entiako Spur. The property, owned by Western Keltic Resources Inc., consists of 100 mineral claim units centred approximately 6 kilometres north of the east end of Laidman Lake and 4.5 kilometres west of Fawnie Creek (Figure 1). Access is provided by the Kluskus-Malaput and Van-Tine Forest Service roads.

The Fawn claim group is underlain by felsic to intermediate volcanic and sedimentary rocks of the Lower to Middle Jurassic Hazelton Group and by dioritic to granodioritic intrusive rocks (Figure 3). The volcanic suite consists of a lower felsic package consisting mainly of heterolithic rhyolite tuff breccia and an upper mainly andesitic package consisting of lapilli tuff, tuff breccia and pyroxene-phyric flows. Local lenses of thinly bedded, interbedded mudstone, limy siltstone and (lapilli) tuffs occur within the andesitic package. Tuffaceous siltstones are exposed at the transition between felsic and andesitic volcanics. Strata are broadly folded around north and northeast-trending axes (Smith and Hoffman, 1984) and have gentle to moderate dips.

Rocks throughout the property are weakly to moderately metasomatized. Epidote, chlorite, calcite and garnet occur along fracture planes, as medium to coarse-grained aggregates, and locally, as altered rims of breccia clasts (Plate 6).

Intrusive rocks of two different ages have been identified. The first, a fine to medium-grained equigranular, locally intensely fractured and pyritic granodiorite to dio-

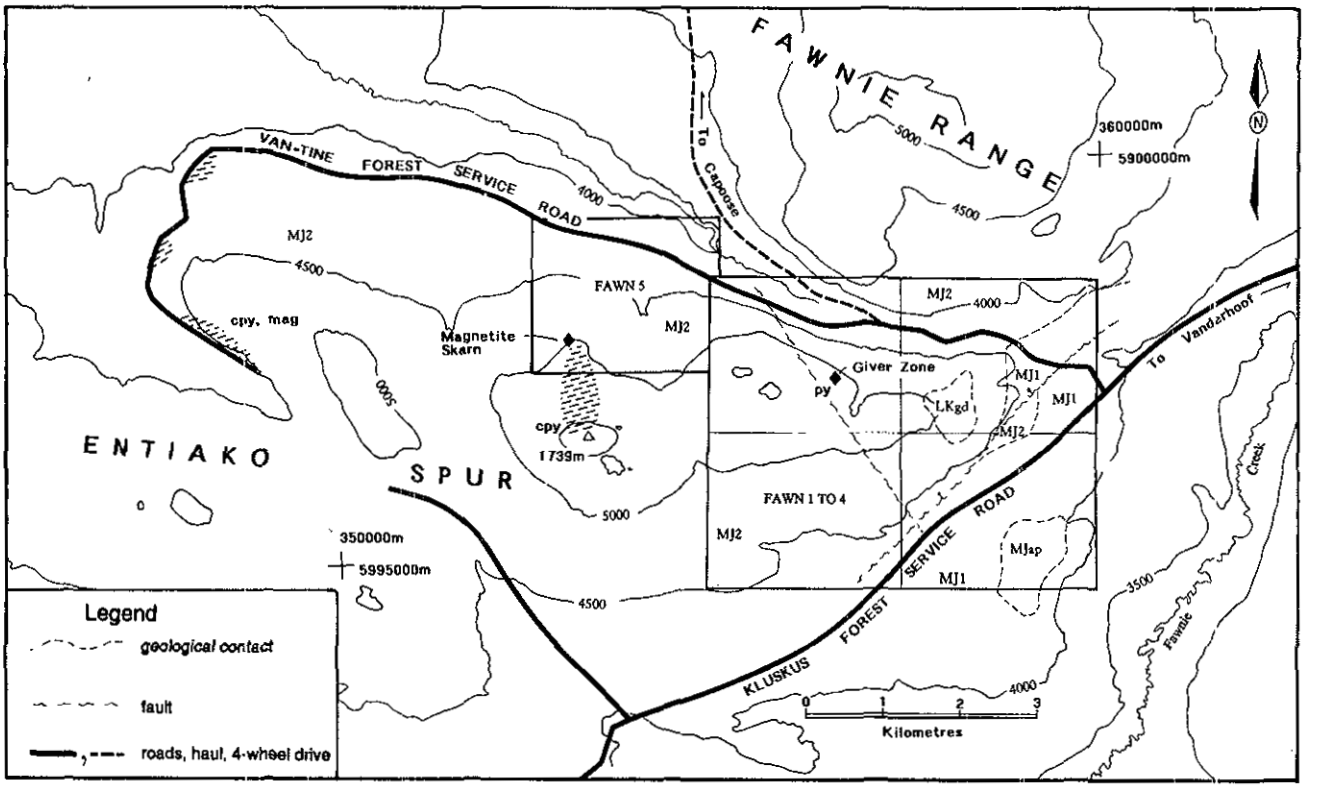


Figure 3. Simplified geological map of the Fawn claims. Legend: **Jurassic Hazelton group**; MJ1, (lower) felsic tuffs, flows and breccias; MJ2 (upper) intermediate to mafic tuffs, flows and pyroclastic rocks with minor sedimentary lenses; MJap, augite porphyry. **Cretaceous Quanchus intrusions**, LKgd, granodiorite. Hatched pattern signifies outcrop to suboutcrop of garnet-pyroxene-epidote magnetie (mag) chalcopyrite (cpy)skarn and biotite hornfels. Pyrite (py) in quartz veins occurs at the Giver zone (diamond) and massive magnetic skarn (diamond) on the Fawn 5 claim. Geology after Diakow and Webster (1994, this volume).

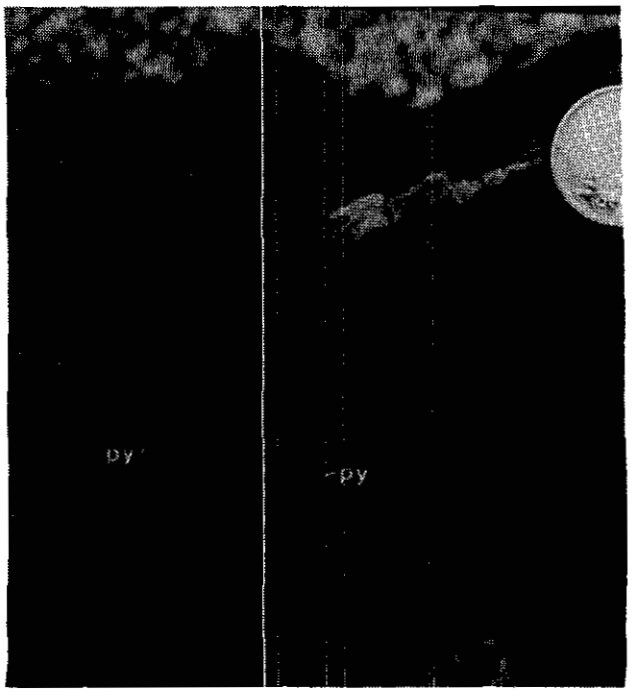


Plate 7. Banded silica with drusy cavities, Giver showing, Fawn property.

rite stock, cuts Hazelton Group volcanic rocks and may be part of the Quanchus Plutonic Suite or an apophysis (or cupola?) of the Capoose batholith (67.1±2.3 Ma) that underlies the relatively thin veneer of Hazelton Group rocks on the property. The second, a suite of porphyritic felsic dikes, cuts all other rock types including the diorite, and may be feeders to the Ootsa Lake (Awmack, 1991) rhyolitic volcanics that crop out elsewhere in the region.

Showings on the property are of two types: precious metal bearing epithermal veins and magnetite±chalcopyrite, garnet-pyroxene-epidote exoskarn (skarn mineralization will be discussed in a later section).

Epithermal style mineralization and alteration have been exposed by limited trenching on the Giver zone in the northern part of the claim group (Plate 7). North to northeast-trending quartz-carbonate-pyrite±barite veinlets cut a northwesterly trending intensely silica, sericite and clay-altered zone. A continuous chip sample over an 8.2-metre width averaged 623 ppb gold and 7.1 ppm silver; grab samples from early 1980s BP Minerals test pits yielded values up to 12.9 grams per tonne gold and 25.0 grams per tonne silver (Awmack, 1991). The veins are also geochemically anomalous in arsenic, lead and zinc. Approximately 2100 metres east of the Giver zone, a quartz-sulphide vein is exposed along the contact between a felsic dike and diorite stock indicating that the

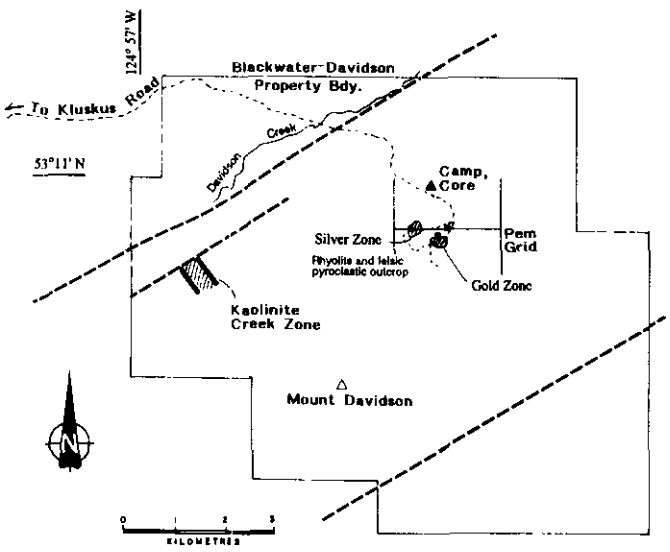


Figure 4. Sketch map of the Blackwater-Davidson property and surrounding area, showing the location of the Gold and Silver zones on the Pem grid and the Kaolinite Creek zone (after Allen, 1992).

mineralization is younger than either intrusive event (Awmack, 1991).

## TRANSITIONAL DEPOSITS

Structurally controlled, polymetallic base and precious metal bearing deposits formed at moderate depths where strongly saline, high-temperature hydrothermal fluids of magmatic origin were active (*i.e.*, transitional upwards from the porphyry copper environment to the epithermal environment). Two such deposits (Blackwater-Davidson and Capoose) exhibit several similar features, including: the occurrence of metasomatic (secondary) garnet in rhyolite, metallic (including sulphosalts) and gangue mineralogy, ore textures (*i.e.*, replacement "spherules"), and widespread phyllic and argillic alteration.

The Equity Silver mine is a classic example of a transitional deposit in British Columbia.

## *BLACKWATER-DAVIDSON (PEM) [MINFILE 093F 037]*

The Blackwater-Davidson property is located approximately 7 kilometres northeast of Mount Davidson, about 160 kilometres south of Vanderhoof (Figure 1). Access to the property is by a 17-kilometre four-wheel-drive road that extends eastward from Kilometre 146 on the Kluskus Forest Service road. The property comprises 22 claims totalling 304 mineral claim units that are wholly owned by Granges Inc. Outcrop on the property accounts for less than 1% of the area. Consequently most information has been obtained from diamond drilling and geophysical surveys. Reports by Allen (1992, 1993) summarise results of the most recent work programs.

The Mount Davidson area was covered by a regional geochemical sampling program completed by Granges in 1973. Stream sediment lead-zinc-silver anomalies led to staking of the Pem claim in 1977. Granges conducted geophysical and soil geochemistry surveys intermittently from 1977 to 1984. A total of 31 core holes and 34 reverse circulation holes were drilled between 1985 and 1987. They identified two areas of mineralization, the Gold and Silver zones (Figure 4). Additional claims were staked in 1985, 1987 and 1991 and in 1992, Granges conducted detailed geological mapping, geochemical sampling, geophysical surveys (IP, magnetic and VLF-EM) and drilled five core holes on the Pem claim.

Most of the work to date has focused on the Pem grid where an area of high resistivity is flanked by a chargeability high and is coincident with a base metal - silver soil geochemistry anomaly. The Gold and Silver zones are both within a zone of high chargeability.

The claims are underlain primarily by Jurassic Hazelton Group stratigraphy consisting of an interbedded succession of argillite, siltstone and sandstone, as well as an intercalated sequence of rhyolitic to dacitic and andesitic to trachyandesitic tuffs, lapilli tuffs, breccias, and flows. Bedding attitudes are rarely apparent, but where seen are flat-lying or gently dipping to the west. Possible Ootsa Lake Group rhyolitic lapilli tuff crops out in the south and southwest of the property. Tertiary Endako Group amygdaloidal andesite flows unconformably overlie Hazelton Group strata in the northwest corner of the claim group.

Structures on the property, interpreted primarily from magnetic data, include subvertical northeast and northwest-trending faults dipping steeply southwest. The significance of these structures is not known, however the Gold and Silver zones occur in a structural block roughly 6 kilometres wide, bounded by northeast-trending faults (Figure 4).

The Gold zone has been interpreted as a structurally controlled, easterly trending, steeply dipping zone up to 70 metres across with a strike length of about 300 metres (Allen, 1992). Disseminated and shear-hosted mineralization occur in felsic lapilli tuffs, breccias and flows that have been affected by mainly phyllic (quartz-sericite-chlorite) and argillic (kaolinite) alteration over a minimum strike length of 900 metres and an undefined width. Mineralization does not appear to be lithologically controlled. There is an apparent correlation of higher gold content with the presence of pyrite with or without pyrrhotite. The most encouraging diamond-drill hole intersections include: hole DAV-11, 14.28 grams per tonne gold across 6.3 metres, and 48.3 grams per tonne gold across 1.3 metres (Zbitnoff, 1988) and hole BD-92-35, 0.72 gram per tonne gold across 47.5 metres (Allen, 1993). A conspicuous 17-metre section of drill core from hole BD-92-33 exhibits about 20% black spherules, up to 8 millimetres in diameter, commonly with 1 to 2-millimetre cores of pyrite±sphalerite (Plate 8). Between spherules, the hostrock contains 5 to 8% fine-grained disseminated sphalerite, pyrite and galena. A similar texture and mineralogy is present at the Capoose prospect, approximately 30 kilometres to the west, where drill-indicated reserves are estimated at 28117 000 tonnes grading

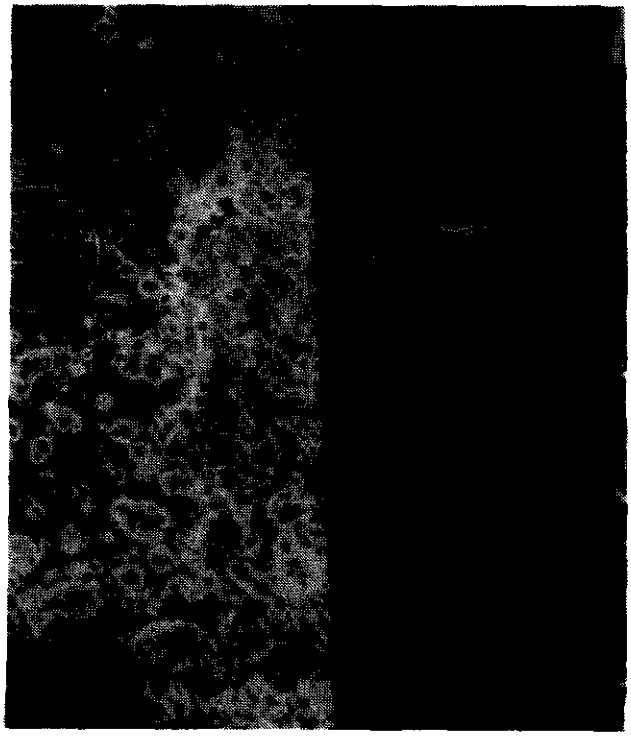

Plate 8. 'Spotted' texture in rhyolite. Dark 'spots' are nuclei growths or diffusion replacements by sulphides/sulphosalts/electrum. The mineralogy of light-coloured 'spots' cored by metallic minerals is unknown, Blackwater-Davidson property (ddh BD-92-33 at 59 metres).

0.52 gram per tonne gold and 37.7 grams per tonne silver (Granges Inc., Annual Report, 1984). Sulphides also occur in several massive (mainly pyrite) zones, in breccias, along fractures, in quartz-lined amygdules, and as replacements of garnet (?) and lapilli up to 1 centimetre in diameter, and in late cross-cutting stringers of sphalerite±galena (± carbonate). Total sulphide content is estimated at about 5% and includes 3 to 4% sphalerite, 1 to 2% pyrite and pyrrhotite, and traces of galena, arsenopyrite, chalcopyrite, tetrahedrite, boulangerite and marcasite(?).

The Silver zone is approximately 500 metres northwest of the Gold zone; its relationship to the Gold zone is not known. It is interpreted to be a relatively flat lying body up to 70 metres thick and is open to the northwest. The Silver zone contains an estimated reserve of 6 million tonnes grading 37 grams per tonne silver and 0.05 gram per tonne gold at a shallow depth (Allen, 1992).

Approximately 600 metres west of the Gold zone subcrop of felsic lapilli tuff-breccia contains individual grains and aggregates of red-brown garnet. The garnets occur in both matrix and fragments, and may have replaced original mafic grains. They are postulated to be products of metasomatism due to the contact thermal effect of the Capoose batholith which is thought to underlie the showings at no great depth. Garnets have not been observed in the Gold or Silver zones.

The felsic pyroclastic rocks that host this zone are typically moderately phyllically altered to patches of fine-grained green sericite±montmorillonite plus trace amounts of quartz, chlorite, dolomitic or ankeritic carbonate and garnet. Manganese oxide and, to a lesser extent, iron oxide, commonly stain fracture surfaces.

Local zones of potassic alteration (quartz-biotite sericite, clays and minor secondary potassium feldspar), dominated by secondary biotite, occur within the phyllic zones. Mineralized zones exhibit sodic depletion and silicia enrichment; potassium levels are elevated in areas of alteration. Traces of tourmaline and rutile have been identified in thin section and specular hematite is relatively common (Allen, 1993).

At "Kaolinite" Creek, 3.5 kilometres west of the Pem grid, a fault-bounded zone of kaolinite-altered quartz-phyric tuff, 400 metres wide, overlies rhyolite that contains up to 5% disseminated pyrite and traces of sphalerite and pyrrhotite.

Analogies for this type of system might be the Capoose, Equity Silver and Red Mountain deposits.

## STRATABOUND DEPOSITS (?)

The stratigraphy of Middle Jurassic Hazelton Group rocks, in at least part of the Interior Plateau area, is similar to the rocks that host the gold-rich Eskay Creek stratabound deposit, north of Stewart, and might suggest the potential for stratabound deposits in the Interior Plateau. However, two significant differences are: most of the Hazelton Group volcanic rocks in the study area are subaerial (with a more felsic component), and the apparent lack of small, structurally controlled basins filled with argillaceous sedimentary rocks.

## *BUCK [MINFILE 093F 050]*

The Buck property is located immediately east of the Fawn claim group (Figure 1). The Buck 1 to 4 claims consist of 80 units that straddle the southwest-flowing Fawnie Creek and the Kluskus Forest Service road. Access to the showings is by a network of four-wheel drive roads that lead to logging clear-cuts within the claim group.

The claims were staked in 1991 and are owned by Western Keltic Mines Inc. In 1982 the same ground, known as the Rocks claims, was investigated by BP Minerals Ltd. (Holt, 1982). It conducted geological mapping, soil and rock geochemistry and trenching focusing on sulphide-bearing ankeritic breccias. There was no recorded work on this ground between 1983 and 1990. In 1992 exploration consisted of geological mapping, prospecting and geochemical sampling and new zones of sulphide mineralization were discovered.

The main area of interest is underlain by a mixed succession of Jurassic Hazelton Group mafic and felsic volcanic and sedimentary rocks that generally strike northerly with gentle to moderate easterly dips. Exposures of rusty weathering, pyritic, dark grey argillites and siltstones are conformably overlain by rhyolitic tuffs and

tuff breccias that resemble those to the west on the Fawn property, with the notable exception that breccias on the Buck property contain abundant clasts of the underlying argillite and siltstone as well as clasts of rhyolite and porphyry. Fine to coarse-grained clastic sedimentary rocks conformably overlie the rhyolite package. Dikes and sills of augite-phyric andesite cut the sedimentary and felsic volcanics and may be feeders to augite-phyric andesite flows that are exposed up-section on both the Fawn and Buck properties.

Stratabound sulphide mineralization is reported to occur in the Rutt zone within a northerly trending clay-sericite-chlorite-silica-altered felsic lapilli tuff unit that has been traced for over 400 metres (Caulfield, 1992). Up to 15% disseminated sphalerite, pyrite and pyrrhotite are present within the altered tuff. Traces of chalcopyrite were also noted. Sphalerite also occurs as a cement or matrix to discrete layers of lapilli. The width of the mineralized horizon is not known but a 3.0-metre chip sample within the zone yielded 2.01% zinc and 306 ppm copper; precious metal values are negligible.

The L14S Trench zone is centred about a kilometre due south of the Rutt zone and consists of ankerite breccia with weakly anomalous zinc, lead, copper, gold and silver geochemical values.

## SKARN DEPOSITS

Infiltration metasomatism related to intrusion of the Capoose batholith has resulted in the formation of iron exoskarn. A large area of metasomatized Hazelton rocks has been identified along the eastern contact of the Capoose batholith. The principal gangue minerals are pyroxene, garnet and epidote. Magnetite is predominant with minor chalcopyrite, pyrrhotite, pyrite and arsenopyrite.

### *FAWN 5 [MINFILE 093F 053]*

Magnetite skarn mineralization occurs in Hazelton Group andesitic pyroclastic rocks on the Fawn 5 claim block at an elevation of approximately 1525 metres (Figure 1). Several outcrops of massive magnetite define an arcuate, generally southeast-trending band of magnetite-rich skarn that appears to be relatively flat lying. Massive to semimassive magnetite with traces of chalcopyrite, is exposed over a width of at least 20 metres and the zone may reach 300 metres in apparent width (Smith and Hoffman, 1983). Calcsilicate mineralogy includes garnet, pyroxene, epidote and actinolite. Up-slope and to the south, epidote-chlorite alteration (magnetite, garnet and pyroxene) of the host pyroclastics is moderate to intense and widespread. Locally, epidote-rich bands have developed along a trend of 070°/75N. These bands mimic bedding and are probably replacements of tuffaceous layers.

Approximately 5 kilometres west of the claim boundary the westerly extension of the Van-Tine Forest Service road (Figure 1) has exposed limy tuffaceous, fossil-bearing sedimentary and intermediate pyroclastic breccias and lapilli tuffs of the Middle to Upper(?) Hazelton Group. Locally well-developed zones of garnet-pyroxene-epidote infiltration skarn are flanked by dark brown to black biotite hornfels that is all but completely devoid of its original texture. Weak to moderate hornfelsing is widespread. Sulphide mineralization is sparse and averages less than 0.5% of the rock by volume. Pyrite, pyrrhotite, arsenopyrite and traces of chalcopyrite occur as fracture fillings and as disseminations in biotite hornfels and skarn. Locally, remnant lapilli have been partly replaced by pyrrhotite. These new outcrops extend the known thermal effect of the Capoose batholith a minimum of 5 kilometres farther to the west of the magnetite skarn showing on the Fawn 5 claim.

## PORPHYRY OCCURRENCES

The calcalkaline Capoose batholith and associated stocks underlie a large area. Zones of intense pyritization with minor chalcopyrite and molybdenite have been identified.

### *PAW [MINFILE 093F 052]*

This new showing is at the end of the Kluskus-Malaput Forest Service road approximately 5 kilometres southeast of the Wolf property (Figure 1). It is covered by the Paw 1 sixteen-unit claim block owned by Perry Grunenberg. It was staked for the first time in July, 1992. The occurrence consists of a single outcrop of medium-grained, equigranular granodiorite to diorite. Fracture controlled and disseminated sulphide mineralization consists of 3 to 4% pyrite and traces of molybdenite and chalcopyrite. Apparently there has been no work done on the property.

### *NED [MINFILE 093F 039]*

The Ned porphyry molybdenum-copper occurrence is located approximately 115 kilometres southwest of Vanderhoof and is centred 3 kilometres southeast of Capoose Lake (Figure 1). Granges Inc. last conducted field work on the property in 1979 and the claims have since been allowed to lapse. The occurrence is north of the study area (NTS 093F/06E) and was not investigated in 1993.

The property is underlain by biotite quartz diorite and quartz monzonite of the Cretaceous Capoose batholith (67±2.3 Ma). Mineralization consists of disseminated and vein pyrite, molybdenite and traces of chalcopyrite. The best assay was obtained from a chip sample across 5 metres which returned 0.046% molybdenite and 0.03% copper with negligible gold and silver (Zbitnoff, 1978).

### *CHU, C (CH) [MINFILE 093F 001, 004]*

The CHU porphyry prospect is located 90 kilometres south-southwest of Vanderhoof and straddles the Kluskus Forest Service road at the Kluskus logging camp (Kilome-

tre 102). Exploration work, carried out from 1969 to 1975 by Rio Tinto Canadian Exploration Ltd., and from 1980 to 1985 by Granges, identified porphyry molybdenum-copper mineralization and a precious and base metal vein target, respectively. Placer Dome Inc. optioned the property in 1990 and in 1991 conducted geological mapping, soil geochemical and geophysical surveys on the property. In 1992 the company completed a 12-hole diamond drilling program to evaluate the potential for a porphyry copper-molybdenum deposit. Placer Dome did not undertake a field program in 1993.

The property is underlain by andesitic volcanic and fine-grained sedimentary rocks of the Lower to Middle Jurassic Hazelton Group. Monzonite to diorite of unknown age has intruded and hornfelsed the Hazelton rocks near the contact. Propylitic alteration consisting of chlorite, epidote and calcite is widespread.

The main area of interest is defined by coincident copper-gold geochemical anomalies, an induced polarization chargeability high, and a high magnetic anomaly (Edwards and Campbell, 1992). Mineralized drill core exhibits strong bleaching, veining and pyritization. Disseminated and fracture-controlled pyrite, up to 15%, minor chalcopyrite and traces of molybdenite occur in both intrusive and volcanic/sedimentary country rocks. Sphalerite and galena are present in late quartz-carbonate veinlets.

## LANDSAT IMAGERY

As a potential aid to field mapping and consequently the study of mineral deposit settings, a brief report on Landsat Imagery has been prepared by J.A. Turner of MineQuest Exploration Associates Ltd. The products consist of two landsat photo enlargements at 1:1 000 000 scale, each covering an area of 92 by 88 kilometres at a resolution of 30 metres, and a mylar overlay showing the traces of lineaments. The image was derived from the Thematic Mapper LANDSAT 5 satellite. The area of coverage is centred near Mount Davidson in the Chilcotin area (NTS 93C, 93F). General interpretations of linear and circular features are:

- large circular features may be remnant volcanic centres.
- northwest-trending lineaments (30 to 100 kilometres in length) suggest major fault systems.
- northeast-trending lineaments are assumed to be deep (crustal?) structures.
- prominent easterly trending lineaments are defined by long narrow lakes (*e.g.*, Johnny Lake and Laidman Lake) and are interpreted to postdate other structures.
- weakly developed northerly trending lineaments occur on the Wolf property and in the area of the Fawnie Range (*e.g.*, Capoose)
- small circular features (some with radiating linears) are common throughout the area.

Unfortunately, ground truthing of the features noted above was not carried out due to time constraints in the field. The data will be examined in more detail over the winter months with possible follow-up next season.

## ENERGY DIVISION FILES

As part of a larger project to produce a regional metallogenic synthesis of the Interior Plateau, initiated by the authors in 1991, data on file with the Energy Division of the B.C. Ministry of Energy, Mines and Petroleum Resources in Victoria were examined and compiled. Further compilation and interpretation of data is planned for the winter months. Cursory examination suggests the potential for outlining several structures and stratigraphic contacts (especially at depth). The data on file have been submitted by oil and gas companies for assessment purposes during exploration programs, carried out mainly in the early 1980s but also dating back to the 1960s.

## ACKNOWLEDGMENTS

Metall Mining Corporation and Fox Geological Consultants Ltd. are gratefully acknowledged for providing excellent tours of their respective properties in the area, including open discussions specific to their projects. Also, private company reports made available by Granges Inc. and Western Keltic Mines Inc. have aided the study greatly.

## REFERENCES

Allen, G.J. (1992): Geology, Geochemistry and Geophysics Report on the Blackwater-Davidson Property; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 22654, 27 pages.

Allen, G.J. (1993): Diamond Drilling Report on the Blackwater-Davidson Property; unpublished report, *Granges Inc.*, January, 1993, 25 pages.

Andrew, K.P.E. (1988): Geology and Genesis of the Wolf Precious Metal Epithermal Prospect and the Capoose Base and Precious Metal Porphyry-style Prospect, Capoose Lake Area, Central British Columbia; unpublished M.Sc. thesis, *The University of British Columbia*, 334 pages.

Awmack, H.J. (1991): Geological, Geochemical and Geophysical Report on the Fawn Property; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 21927, 155 pages.

Cann, R.M. (1984): Wolf Claims: Geology, Geochemistry and Trenching, 1984; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 13968, 27 pages.

Caulfield, D. (1992): Geological and Geochemical Report on the Buck 1 - 4 Claims; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 22569, 12 pages.

Diakow, L.J. and Webster, I.C.L. (1994): Geology of the Fawnie Map Area (93F/3), *in* Geological Fieldwork 1993, Grant, B. and Newell, J.M., Editors, *B.C. Ministry of Energy, Mines and Petroleum Resources*, Paper 1994-1, this volume.

Edwards, K. and Campbell, T. (1992): Assessment Report for the CH 10-16 Mineral Claims; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 22027, 89 pages.

Holt, E. (1982): Fawnie Creek Geochemical Report on the Rocks Mineral Claim; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 10787, 17 pages.

Smith, M. and Hoffman, S. J. (1983): Geological and Geochemical Report on the Gran 7 Claim; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 12032, 58 pages.

Zbitnoff, G.W. (1978): Report on the Ned Cla m; unpublished report, *Granges Inc.*

Zbitnoff, G.W. (1988): Diamond Drilling Repor on Pem Clain, #554; *B.C. Ministry of Energy, Mines and Petroleum Resources*, Assessment Report 17032, 97 pages.

# NOTES