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I. INTRODUCTION

1. Geographic and Physiographic Position

The Punch Claims, centered at 52°23'N and 118°10' W, are located in the Athabasca Pass , 60 km south-southwest of Jasper, Alberta, or alternately, 95 km southeast of Valemount, B.C., in the northern Park Ranges of the central Canadian Rocky Mountains (Fig. 1). Property access is gained by helicopter based at Valemount. The nearest highway (Highway 23) terminates at the Mica Dam, 50 km to the southeast. Commercial logging roads, originating near Valemount, have penetrated as far as Hugh Allan Creek, approximately 25 km to the northwest.

2. Property Definition

The Athabasca Pass was pioneered in the early 1800's by David Thompson, as an alternate route through the Main Ranges to the Columbia River. A trading post was established near the Committee Punch Bowl, but the route fell into disuse by the middle of the nineteenth century. The area has no recorded mining history. Minor placer workings to the south of the claim area, in the Wood Arm, and to the northwest of the claim area, along Hugh Allan Creek, are said to date from the 1920's.

Interest in the property stems from the discovery of gold-bearing talus near the Committie Punch Bowl by Mr. Anthony Klettl (father of one of the claim proprietors), in the late 1960's. This talus was later traced to an outcrop showing by the current claim owners/operators, Robert Klettl, Brian Fowler, and Garry Forman. The original property (comprising 124 "Punch-Bowl" claims) was optioned to Gamsan Resources Ltd. of Edmonton, Alberta, in 1987. Reconnaissance prospecting, mapping, and stream-sediment sampling programs were done by Gamsan in 1987 however assessment work for 1987-88 was not filed and the property was allowed to lapse. Such action was a breach of the option contract, hence the contract was terminated. Portions of the original property were immediately re-staked (the current 66 "Punch" claims) by Messrs. Klettl, Fowler, and

Forman in September/October of 1988.

This report presents the results of laboratory-based studies carried out by the author in the fall of 1988, and intermitantly from January to September of 1989. These studies are based upon detailed field-mapping and sampling in the claim area by the author throughout August of 1988.

3. Summary of Work

i) Geological Survey

Correlation of the stratigraphy of the claim area has been established and the geology of the claim area has been tied in on a regional scale. 1:50,000-scale geologic maps covering most of the claim area have been produced.

ii) Petrographic Analysis

Petrographic examination of numerous hand specimens and 82 standard thin, and polished-thin sections, made from mineralized and unmineralized vein, host-rock, and country-rock material collected within the claims, was completed.

iii) Multi-elemental Analysis

A lithogeochemical survey involving 23 mineralized and unmineralized rock samples from within the claims was done. 32 elements were analysed by inductively coupled plasma emission spectroscopy (ICPES) (Appendix 2).

4. Claims on which work was performed

Claim Blocks - Punch 10
- Punch 13
- Punch 70

II. TECHNICAL DATA AND INTERPRETATION

1. Purpose

Studies were designed to gain understanding of the lithologies encountered on the Punch Claims. Petrographic investigation established the identification of the various lithologies, the degree of deformation and metamorphism, vein and ore mineralogical and paragenetic relationships, and the nature and degree of host-rock alteration surrounding the veins. The ICPES multi-element study was designed to characterize and contrast the geochemical signature of the mineralized veins and unmineralized lithologies in hopes of identifying pathfinder elements applicable to further exploration.

2. Results and Interpretation

i) Regional Geology

The Punch Claims lie at the boundary between the eastern Main Ranges and western Main Ranges of the central Rocky Mountains (Price and Mountjoy, 1970, Wheeler *et al.*, 1972). The boundary at this latitude is marked by a southwest-dipping thrust fault, the Chatter Creek fault, which extends from the headwaters of the Fraser River, southeasterly through the claim area, to the northwest of Golden. Southwest of the Punch Claims, the hanging wall of the Chatter Creek fault is composed of grits, pelites, psammites and carbonates of the Hadrynian Miette Group, overlain by Lower Cambrian clastics of the Gog Group. This region is dominated by broad open folds comprising the Baker Glacier Syncline and Porcupine Creek Anticlinorium (Price and Mountjoy, 1970). Northwest of the Punch Claims, across the head of Hugh Allan Creek, the Chatter Creek thrust sheet contains another major antiformal structure, the Fraser River Antiform (Mountjoy and Price, in prep.). Within the Chatter Creek thrust sheet, metamorphic grade increases westward from greenschist grade to kyanite-staurolite-bearing assemblages of amphibolite grade (Read, 1988).

The footwall of the Chatter Creek fault, to the north and east of the Punch Claims is composed of Lower Cambrian Gog Group, overlain by a series of thickly-bedded, dominantly carbonate rocks, of Middle Cambrian age. The structure of this eastern sector of the Main Ranges consists of thick, relatively flat, thrust sheets with characteristically broad, open folds. Rocks of the eastern Main Ranges have been regionally metamorphosed to pumpellyite and lower greenschist grades (Read, 1988).

ii) Local Geology

The geology of the Punch Claims and surrounding area is illustrated in Figure 2. To date, gold-bearing quartz veins have been found only in the lowermost formation of the Gog Group, the McNaughton.

a) Stratigraphy

Locally, the Punch Claims are underlain by Hadrynian Miette Group, Cambrian Gog Group and ungrouped Middle Cambrian strata. Thicknesses of most stratigraphic units have been modified by folding and faulting.

Miette Group

The Miette Group of the northern Park Ranges is divisible into three informal, mappable units; Upper, Middle and Lower (Mountjoy and Price, in prep.). Strata of the middle and possibly Upper Miette comprise the western buttress of the Athabasca Pass, in the hanging wall of the Chatter Creek thrust. Well bedded, grey weathering, 3-50 m thick composite grit units are interbedded with green, silver-grey or black pelites and slates. Typical grit units are normally graded with basal, unsorted pebble conglomerates grading into medium to coarse-grained psammites and, less commonly pelite to semi-pelite. All rock-types may contain cubic porphyroblasts of pyrite although these are generally more abundant in the fine-grained lithologies.

Gog Group

Within the claim area, strata of the Gog Group comprise the immediate footwall of the Chatter Creek thrust on the eastern side of the Athabasca Pass. A tripartite subdivision of the Gog Group consisting of the lowermost McNaughton, the Mural, and the uppermost Mahto Formations have been mapped in this area.

McNaughton Formation

It is within this formation that gold-mineralized quartz veins are contained, thus the nature of this clastic sequence will be delt with in more detail than devoted to surrounding strata.

The McNaughton Formation comprises a variety of mature, quartz-dominated clastic lithologies of sub-greenschist metamorphic grade. The predominant lithology is a medium- to coarse-grained, moderately- to poorly-sorted, pale weathering, grey quartzite. This quartzite contains a variable amount of pelitic material, 5-10 percent on average, although units grading to quartzitic pelite and pelite are not uncommon. Generally well-stratified, quartzite lithologies form sequences of 0.1 to 3 m thick beds randomly parted with pelite horizons. Most of the quartzite beds are tabular although gently undulatory and wedge-shaped beds are also present. Feldspar content is low, generally less than 3 percent. Both phyllosilicate and feldspar content are highest in the lower exposed portions of the section. Colour variations in quartzite include darkening shades of green, and purple to black; the former representing increasing phyllosilicate content in the matrix, the latter reflecting increasing hematite content in the cement.

Minor conglomerate occurs as the basal portion of graded beds or as lenticular beds up to 0.3 m in thickness. Conglomerates are generally matrix supported. Sub-equal amounts of well rounded quartzite and vein quartz clasts, ranging up to 25 mm in greatest dimension, are contained within a poorly sorted matrix of medium to fine quartz sand and phyllosilicates, cemented by silica. Phyllosilicates average 25 percent of the matrix.

Pelites comprise approximately 2-3 percent of the McNaughton Formation occuring primarily as discrete, discontinuous, 5 cm to 1 m interbeds in the quartzites, or commonly, at the top of normally graded sequences. They consist almost entirely of fine-grained white micas with variable quantities of granule- to sand-sized detrital quartz grains and are generally pale green in colour. Darker green and grey to black varieties are also seen. The pelites commonly contain up to 3 percent very finely disseminated pyrite.

Paleo-environmental interpretations of the McNaughton Formation include a tidally-dominated association of shallow marine shelf environments in the eastern Main Ranges, and fluvial braidplain to tidal complex transitions in more westerly outcrops (Young, 1979). Paleocurrent studies indicate a predominantly westward and southwestward transport of sediments, the inferred source area being the high-grade metamorphic and igneous rocks of the North American craton, with a possible minor contribution reworked from earlier-deposited sandstones (Young, 1979).

Murel Formation

A 130 m thick section of the Murel Formation outcrops on the claim area south of McGillivray Ridge. The section may be subdivided into three distinct units; a basal, medium bedded, dark grey weathering buff rust limestone; a medial, thinly bedded, recessive weathering, calcareous to silty pelite; and an upper, thickly bedded, light pink to cream, weathering pink and purple, coarsely crystalline dolomite.

Mahto Formation

In the claim area, the Mahto Formation consists dominantly of thin to medium bedded, white and light brown weathering grey quartzites with thin interbeds of light green weathering dark grey pelite and silty pelite. The upper part of the formation is more thickly bedded and contains lesser pelitic interbeds. Abundant trace fossils including *Skolithos* and *Planolities* are present in the lower part of the formation.

Immediately overlying the Mahto quartzite is approximately 40 m of light grey, weathering buff limestone containing abundant 1-2 cm oncolites. Based on published discriptions, this unit may be correlative with the Hota or stratigraphically equivalent Peyto Formation (Palonen, 1976).

Middle Cambrian Strata

A thick section of massive to laminated and oolitic, dark grey weathering rust limestone and dolomite with subordinate fissile pelite and calcareous pelite underlies the eastern portion of the claim area. Correlation of these strata with the Snake Indian and overlying Eldon Formations of Middle Cambrian age is proposed by Mountjoy and Price (in prep.).

b) Mineralization

Gold-quartz mineralization outcropping on the southwest slope of McGillivray

Ridge is contained in a series of discrete vein structures confined to quartzites ± pelites of the McNaughton Formation. The quartzites appear mostly unaltered on the mesoscopic scale and apparently contain no disseminated epigenetic gold mineralization. To date over 20 veins have produced anomalous gold values. Distribution of gold within individual veins is highly erratic with visible gold observed in many cases.

Vein Type, Morphology and Distribution

Two categories of quartz veins are recognized on McGillivray Ridge; veins which parallel bedding planes within the McNaughton Formation, and veins which are discordant to sedimentary layering. Thus far only bedding-parallel veins contain high-grade gold mineralization.

Bedding-Parallel Veins

Bedding-parallel veins vary from about 1 m in length and a few centimeters in thickness up to 50 m in length, varying between 0.7 and 1 m in thickness. They weather recessively, and locally exhibit surficial gossan due to the oxidation of pyrite. Their lateral extent is presently unknown. Inspection of bedding-parallel veins indicates that, in all cases, these structures invade bedded pelites, the remnants of which are generally seen as angular, brecciated fragments within the veins. In most cases the pelites have been entirely disrupted by veining, creating a vein-quartz supported, pelite breccia. Thus these veins essentially parallel the pelite horizons they have invaded. Vein size and distribution was fundamentally controlled by the geometry and distribution of the original pelite layers in the McNaughton Formation.

Lateral lithologic variation within pelites also appears to have exerted control on the localization and extent of bedding-parallel veining. This is suggested where individual quartz veins die out along strike, coincident with an increase in detrital quartz in the associated pelite horizon. Veining may reappear futher along strike as the horizon again becomes more pelitic. Veining is not developed in horizons containing greater than approximately 30 percent detrital quartz. Pelite fragments in veins generally contain less than 10 percent quartz grains.

Discordant Veins

Discordant veins are confined to the competent quartzitic lithologies of the McNaughton Formation. Their occurrence is widespread, either as individual isolated veins, en echelon vein arrays, or as clustered vein stockworks which extend discontinuously for tens of meters. Individual veins are generally planar to sigmoidal in shape and range in size from centimeter-scale fracture fills to veins 3 m in length and 10 cm in thickness.

c) Host Rock and Vein Petrography

Petrographic study of hand specimens and thin- and polished-thin- sections of vein and host-rock material (Appendix 1) was undertaken in order to document vein-textural, mineralogical, and paragenetic relationships and to evaluate the degree of host-rock alteration.

McNaughton Formation-McGillivray Ridge

The mineralogy of the McNaughton lithologies consists of three components; quartz, white mica and, potash feldspar. The modal abundance of these components in over 90 hand specimens from the claim area are plotted in the form of a ternary diagram (Fig. 3). Modal composition ranges from quartzitic pelite to feldspathic quartzite. Pelitic quartzite containing 5-10 percent white mica is the most common lithology. The occurrence of white mica is variable but ubiquitous. K-feldspar content is erratic with 15-20 percent feldspar recorded in some horizons, but less than 3 percent being more typical. Varietal minerals are rare. Those observed in thin section include epidote, rutile, zircon, augite, and muscovite. Anhedral to euhedral porphyroblasts of pyrite are common in the more pelitic McNaughton lithologies, where they may comprise up to 3 percent of individual horizons. Minor (<2%) recrystallized carbonate is widespread, as is the incipient replacement of K-feldspar by white mica ± carbonate.

Bedding-parallel veins

Quartz is the dominant vein-filling phase, typically comprising over 95 percent of the total vein volume. Variable, unevenly distributed amounts of sulfide, carbonate, and white mica comprise the remaining modal fraction. Brecciated fragments of host pelite may comprise a significant volume within individual veins, depending on overall vein size, and the degree of fracturing and disaggregation of the pelite horizon. The distribution of hydrothermal vein constituents generally follows that of the pelite fragments, with the quantity of sulfides, carbonate, white mica, and gold being markedly higher in zones of intense pelite brecciation.

Internal vein structures and textures

In general, the margins of bedding-parallel veins are marked by an abundance of brecciated pelite fragments. These represent the remnants of pelite horizons which have been entirely disaggregated by quartz veining. Quartzites presently form the adjacent wall rocks to most veins. Where pelite occurs at the top of normally graded beds, brecciation and veining occurs where pelite predominates. Anastomosing veinlets may extend into the quartz-dominated host lithology. Pelite fragments are less abundant or absent toward the centre of larger bedding-parallel veins.

The majority of quartz was deposited as open-space fillings during one or more episodes of vein-opening. Well terminated, millimeter- to centimeter-sized quartz crystals indicate unimpeded crystal growth during vein filling. These crystals are usually truncated, dislocated, and overgrown by similar quartz deposited during subsequent reopening and filling events, creating a generally massive vein texture. Vein reopening took place within previously deposited vein fillings, along the wallrock-vein contact, or preferentially, along the margins of larger pelite fragments. Pelite fragments are commonly cut by more than one generation of quartz veining. The orientation of successive fracture fillings is usually not aligned with previous vein fillings or the wallrock-vein contact, although these subsequent vein-fillings are spatially confined to the vein/pelite horizon and do not cut the quartzite wall rocks. No open spaces are observed in the veins.

Laminated textures indicative of incremental vein growth ("crack-seal filling") are locally developed further suggesting multiple episodes of vein reopening.

Mineralogy

Bedding-parallel vein minerals are outlined according to their paragenesis. Brecciated pelite fragments are considered vein constituents because the original bedded character of these pelites has been destroyed by the veining process.

Pelite Fragments: Angular fragments of pelite range in size from microscopic inclusions to several centimeters in greatest dimension. These fragments are generally most abundant near the vein margins where they may constitute greater than 50 percent of the vein volume. Contacts between pelite fragments and the surrounding vein-quartz matrix are sharp, with the pelite exhibiting little visible evidence of hydrothermal alteration. A weak, pervasive foliation is present in the pelite fragments, with a distinct crenulation cleavage being noted in some cases. Neither the pelite fragments nor their foliation exhibit a preferred orientation or common alignment within the veins.

Pelite fragments in thin section occasionally reveal a thin (<*ca.* 0.1 mm) selvage of relatively coarse, hydrothermally recrystallized mica with individual crystals up to 0.3 mm in length. This unfoliated selvage surrounds a finer grained core of weakly foliated white mica, the product of archimetamorphism.

Many pelite fragments contain the oxidized remnants of a finely disseminated, iron-rich phase, likely pyrite, which may be seen unaltered in the center of the inclusions. Hydrous iron oxides (limonite-goethite) now occupy the fine (≤0.2 mm) anhedral to subhedral casts. Based upon its petrographic character, this pyrite is considered to be metamorphic in origin.

Quartz: This mineral accounts for greater than 90 percent of the hydrothermal vein-filling constituents. On the basis of textural and optical characteristics in hand specimen and thin section, three distinct varieties of quartz, Types I, II and, III are discernable.

Type I quartz constitutes 90-95 percent of the vein-filling quartz. It is commonly comprised of massive aggregates of well terminated, millimeter- to centimeter-sized crystals. Well developed, submillimeter-scale growth zonation in euhedral crystals is discernable in hand specimen. Fine-grained (≤0.05 mm) white mica enhances these growth zones in thin section.

Type I quartz is readily identifiable in plane-polarized light by multiple generations of healed fractures, presently demarcated by trails of fluid inclusions. In cross polarized light undulatory extinction and sub-grain development are ubiquitous. Deformation lamellae are locally well developed. Pressure solution causing grain boundary suturing is widespread, and where abundant is accompanied by incipient recrystallization along neighbouring grain boundaries. Fine-grained, recrystallized quartz exhibits distinct undulatory extinction.

Type II quartz is locally developed granular, fine-grained (1-2 mm) quartz which occupies thin (0.5-2 cm), discrete veinlets contained within earlier deposited Type I quartz. Petrographically, Type II quartz is polygonal in form and exhibits healed fractures, undulatory extinction and subgrain development. Type I quartz grains bounding these veinlets are generally highly strained and sutured thus, Type II quartz is interpreted as local, pressure solution-derived vein quartz, deposited in discrete dilational fractures created during the progressive deformation of earlier deposited Type I vein-fillings.

Type III quartz is distinguished in hand specimen by its milky white colour and fine- to medium-grained (1-5 mm) granular texture. This variety of quartz is not confined to discrete structures, but is seen filling diffusely bound fractures and voids of variable size and shape, most commonly originating near vein margins and extending into Type I and II vein structures. Microscopically, Type III quartz exhibits a lesser degree of deformation than early Type I. Undulatory extinction is ubiquitous but of lesser intensity. Subgrains, sutured grain boundaries and healed fracture patterns are also locally developed but to a much lesser degree.

Type III quartz is also distinctive for the greater quantities of associated white mica, pyrite and native gold relative to quartz Types I and II.

White Mica: This minor vein constituent (<1%) is fine-grained (0.01-0.1 mm), occurring as disseminations and aggregates along late, partially healed fractures in quartz. White mica tends to be more abundant in Type III quartz but is also seen lining fractures in Types I and II quartz.

The origin of much of the fine disseminated and fracture dispersed white mica is considered to be in part hydrothermal, but a significant quantity (perhaps 50%) of all the white mica is considered to have been derived through brecciation and dispersal ± recrystallization of original pelitic host-rock material. It is generally not possible to petrographically distinguish these mica types.

Pyrite: Two generations of pyrite are recorded. The first, metamorphic pyrite in pelite, has been described. The second (< 1% of total vein volume) consists of 0.05 to 5 mm subhedral to euhedral cubes which commonly exhibit finely striated crystal faces, and is hydrothermal in origin. The majority of hydrothermal pyrite occurs as disseminations, clusters and fine stringers in Type III quartz, or in the immediate vicinity of (*ca.* 5 mm radius), nucleated upon, or replacing pelite fragments in Types I and III quartz. Pelite-unaccompanied pyrite in Type I quartz is rare.

Post-depositional deformation of hydrothermal pyrite is uncommon. Minor fracturing is filled with quartz, and occasionally, native gold. Sporadic inclusions of white mica, quartz, and native gold also occur in pyrite.

Gold: Although most of the bedding-parallel veins contain gold, its distribution within individual veins is erratic, its presence being enhanced in zones containing abundant pelite fragments, hydrothermal pyrite and Type III quartz, concentrated near vein margins.

Gold is present exclusively as the native metal. Sub-equant inclusions range from 0.04 to about 2 mm in size, occurring close to, or abutting against, brecciated pelite fragments or hydrothermal pyrite crystals. Less commonly, inclusions in pyrite are seen.

Native gold also occurs as fracture fillings in Types I and III quartz. In Type I quartz, gold occurs as fine dendritic fillings up to 5 mm in greatest dimention. Gold filled fractures are generally traceable to nearby (up to 1 cm distant) zones of Type III quartz mineralization. Fractures confined to Type III quartz also contain gold and usually propagate from zones rich in hydrothermal pyrite, white mica and pelite breccia. Very rarely, gold with pyrite fills fractures in Type II quartz.

Galena: Occurrences of galena are limited to sporadic, irregular, undeformed fracture fillings in Types I and III quartz, where it is commonly accompanied by native gold. Minor replacement by hydrous iron-oxides has taken place at the perimeter of galena fills. Although the presence of galena is a good indicator of enhanced gold concentrations, galena is actually less common than visible native gold.

Carbonate: Occurrences of small (<3 mm), anhedral to euhedral inclusions of rust-brown weathering carbonate are rare. When present, this mineral is seen abutting pelite fragments in Type I quartz, or accompanying pyrite ± native gold in Types II and III quartz. Based upon its brownish color the carbonate is likely ankeritic in composition.

Discordant Veins

Discordant veins are filled with quartz, and rarely minor pyrite (<0.5-1%). Quartz is medium-grained, massive to granular, anhedral, and exhibits fracturing, undulatory extinction, and minor pressure solution. Pyrite is fine-grained (<3 mm) and subhedral to euhedral. Discordant veins exhibit essentially one stage of vein filling. Visible gold has not been observed.

Vein Paragenesis

Two broad generations of vein filling are recorded in the bedding-parallel veins of McGillivray Ridge. The first of these (pre-gold stage), represented by pelite fragments, Types I and II quartz and hydrothermal white mica ± minor pyrite and carbonate, records a protracted history of repeated vein opening and filling during which over 90 percent of the hydrothermal vein constituents were precipitated, predominantly as open space ± laminated fillings. The second generation (gold and post-gold stages) of vein filling represents a late, volumetrically minor incursion of hydrothermal fluids during which most of the gold was deposited. Within this stage, deposition of most of the Type III quartz and pyrite ± white mica and carbonate was followed by late co-precipitation of quartz, pyrite, gold and galena. Discordant veins exhibit a single stage of vein-filling during which quartz and occasional pyrite were co-precipitated.

d) Deformation - Metamorphism

Microstructures observed in quartz grains are dominantly pressure solution features including grain-to-grain contact suturing, marked grain serration and embayment, and stylolite development. Undulatory extinction is variably developed, being pervasive in grain supported quartzites but less distinct in matrix supported pelitic quartzites

White mica in the quartzitic lithologies probably represents recrystallization, during low grade regional metamorphism or deformation, of an originally allogenic clay component. Foliation defined by these micas becomes discernable as phyllosilicate contents reach 20 to 30 percent. Individual phyllosilicate crystals average 0.05 mm in length, becoming coarser along solution contacts between quartz grains, within quartz grain embayments, and along stylolitic partings. The pyrite porphyroblasts and recrystallized carbonate noted earlier are also considered the products of regional metamorphism. An archimetamorphic (*ca.* pumpellyite facies) regime is implied by the assemblage quartz-white mica ± pyrite ± carbonate and by the deformational microstructures outlined above.

e) Hydrothermal Alteration

Wall-rock alteration is notably absent adjacent to most bedding-parallel veins. Where veining has initiated at the top of graded beds minor pyritization is occassionally developed in the adjacent, unveined pelitic quartzite. Similar sulfidation is also noted where discordant vein structures cut pelitic quartzites which lack bedding-parallel vein development. Zones of sulfidation immediately adjacent to veins may carry up to 1 ppm gold.

More widespread is the incipient replacement of detrital potash feldspar by white mica ± minor iron-rich carbonate. The origin of these constituents is ambiguous as their occurrence is not restricted to the strata adjacent to veins. They may represent a hydrothermal assemblage associated with vein filling, but are more likely the products of regional archimetamorphism.

Based upon its spatial association with bedding-parallel veins and auriferous nature, wallrock sulfidation likely accompanied gold-stage vein-filling. Sulfidation adjacent to some discordant veins also suggests a penecontemporaneous gold-stage-discordant vein-sulfidation relationship.

iii) Multi-Elemental Analysis

In order to characterize the trace-element geochemistry of the McNaughton Formation in the claim area, 23 samples, including (a) unveined pelitic quartzite and conglomerate, (b) unveined pelite, (c) highly anomalous (arbitrarily > *ca.* 15 ppm Au) gold-bearing vein, (d) slightly anomalous (arbitrarily < *ca.* 1 ppm Au) gold-bearing vein, (e) brecciated pelite ± minor vein material, and (f) unmineralized discordant quartz vein were analyzed by ICPES, for 31 elements. Gold and silver contents were determined by atomic absorption spectrometry (AAS) and fire assay. All analyses were performed by Eco-Tech Laboratories, Kamloops, B.C.

Results

Appendix 2 contains the sample descriptions and results of the ICPES survey. The following observations are noteworthy. In general, vein and vein-associated lithologies show a variable, yet distinct, enrichment of most trace elements in the suite with respect to the unmineralized host lithologies. Gold shows the greatest enrichment in all vein samples. Silver, zinc and copper show negligible to minor (near level-of-detection, therefore possibly only apparent) enrichments, while lead, arsenic and barium show enrichment between approximately two and ten times their concentrations in the host lithologies. The behaviour of iron is somewhat more complex with the mineralized lithologies showing enrichment over the quartzose host lithologies and depletion with respect to the unmineralized pelitic lithologies. Other elements of interest (Sb, W, Te, Tl, B) were below their respective limits of detection.

It is apparent that with the exception of gold, the veins are conspicuously unenriched in trace elements commonly seen in vein-type gold deposits (Boyle, 1979). However, in relative terms, distinct (although non-proportional) enrichments of lead, arsenic, iron and barium correlate positively with gold content in the lodes and are in accord with the temporal and spatial relationships between gold-galena-pyrite and white mica ± pelite fragments in the mineralized structures.

3. References

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III. ITEMIZED COST STATEMENT

1.) ICPES Multi-Elemental Analyses	
23 rock samples @ $12.00/sample	**$276.00**
2.) Petrographic Thin Sections	
74 standard thin sections @ $10.00/section	**$740.00**
8 polished thin sections @ $21.00/section	**$168.00**
3.) Consultant: Literature and laboratory research, petrographic examination and interpretation, report preparation, cartography, drafting	
30 days @ $190.00/day	**$5700.00**
Total	**$6884.00**

IV. STATEMENT OF QUALIFICATIONS

I, Robert Peter Shaw, of the municipality of Edmonton, Alberta, do hereby certify that:

1) I am a geologist-in-training, residing at 10011-87 avenue, Edmonton, Alberta, T6E 2P1.

2) I am registered in good standing with the Association of Professional Engineers, Geologists, and Geophysicists of Alberta, Edmonton.

3) I hold a Bachelor of Science degree (University of Alberta, 1987) in the subject of geology, and am currently working toward a Master of Science degree (geology) at the University of Alberta.

4) I have conducted field- and laboratory-based studies pertaining to the Punch Claim area intermittantly since July, 1988. These studies will form the basis of a formal Master of Science thesis performed at the University of Alberta.

5) I do not hold, nor do I expect to aquire, any interest, either direct or indirect, in the properties reported upon in this document.

RPShaw

Robert P. Shaw, B.Sc., Geol. I.T.
October, 1989

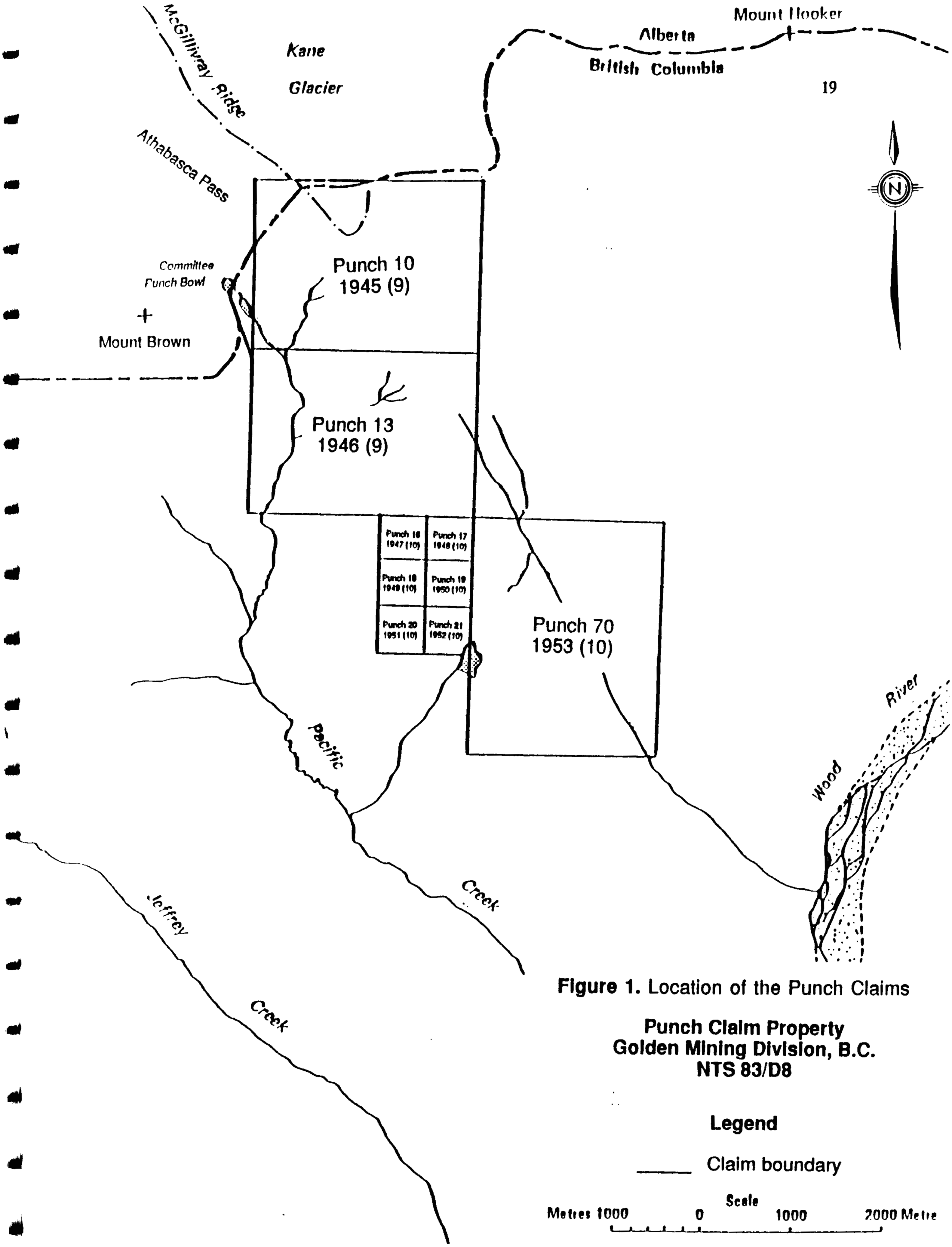


Figure 1. Location of the Punch Claims

Punch Claim Property
Golden Mining Division, B.C.
NTS 83/D8

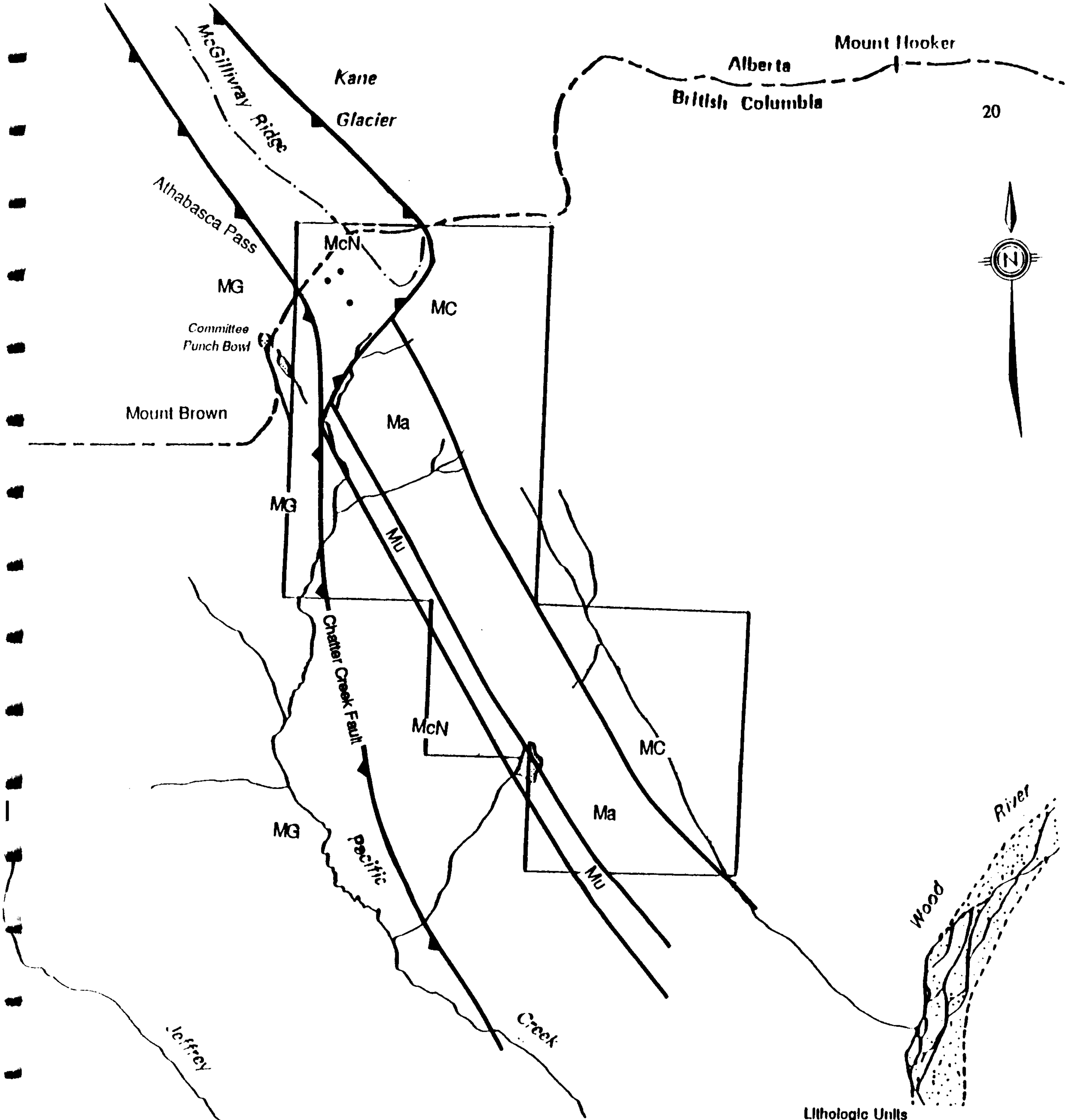


Figure 2. Geology of the Punch Claims

Punch Claim Property
Golden Mining Division, B.C.
NTS 83/D8

Legend

- Claim boundary
- Geologic contact
- Thrust fault
- ● Mineralized vein

Lithologic Units

MC	Middle Cambrian; carbonate, calcareous pelite
Ma	Mahto Formation; quartzite, pelite
Mu	Murel Formation; carbonate
McN	McNaughton Formation; quartzite, pelite
MG	Miette Group grit, pelite, carbonate

Scale

Metre 1000 0 1000 2000 Metre

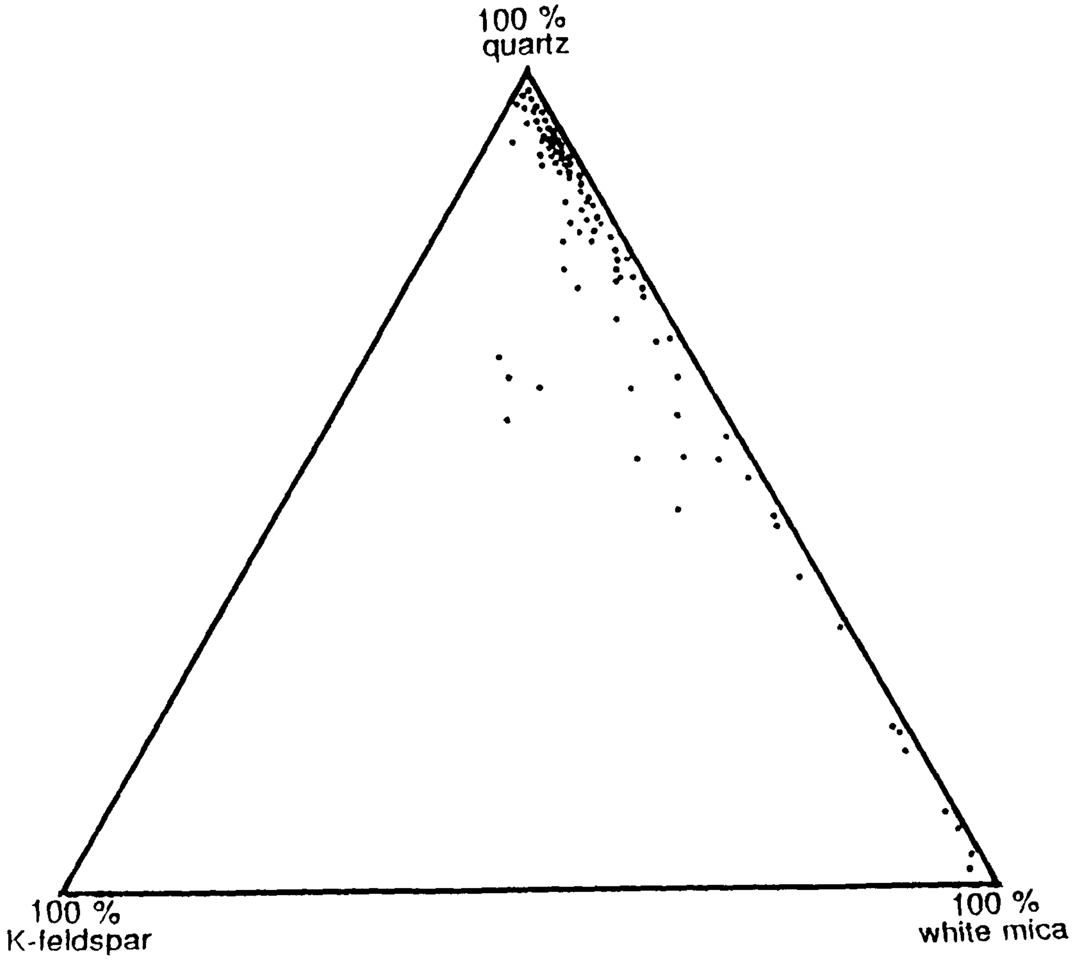


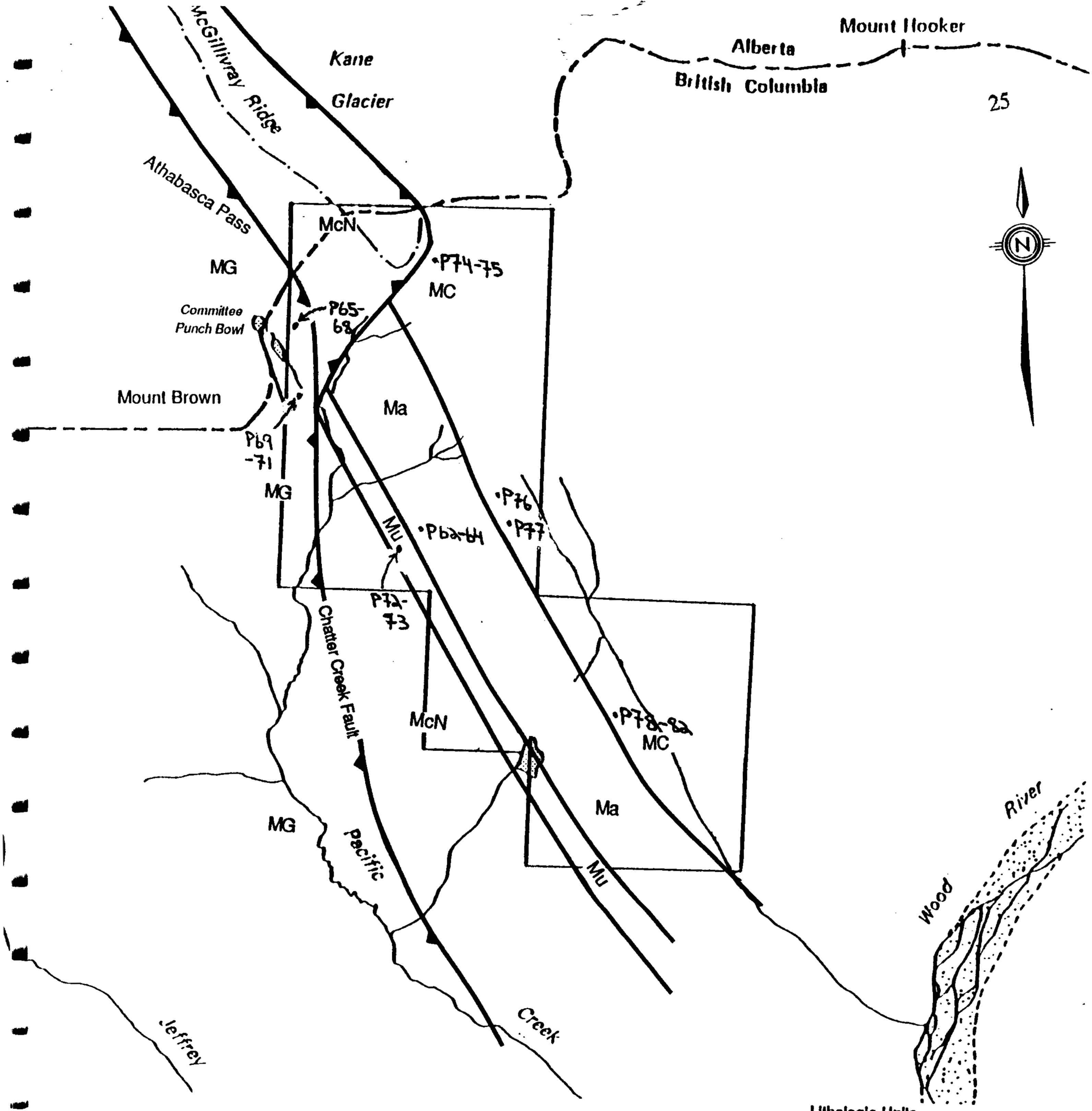
Figure 3 Modal composition of the McNaughton Formation lithologies of McGillivray Ridge.

APPENDIX 1

THIN- AND POLISHED-SECTION PETROGRAPHY: SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Description
	Polished-thin sections
P-1 to P-8	Well-mineralized bedding-parallel vein material fron McGillivray Ridge; quartz (Types I, II, III), pyrite, sericite ± Fe-carbonate, galena, native gold.
	Standard thin sections
P-9 to P-25	Mineralized and unmineralized bedding-parallel vein material from McGillivray Ridge; mostly quartz with pelite fragments, pyrite, sericite ± Fe-carbonate, galena, native gold.
P-26 to P-41	Sparsely mineralized and unmineralized pelite from veined and unveined pelite horizons on McGillivray Ridge; greenish-tinted (Fe^{2+}-bearing) sericite with up to 10% detrital quartz ± metamorphic and/or hydrothermal pyrite.
P-42 to P-58	Unmineralized McNaughton Quartzite from McGillivray Ridge; detrital quartz ± sericite, orthoclase and varietal muscovite, epidote, augite, rutile, zircon, and metamorphic pyrite, Fe-carbonate,and sericite. Minor discordant quartz veining.
P-59 to P-61	Discordant quartz veining from McGillivray Ridge; quartz, occassional pyrite, sericite with quartzite to pelite wallrock.
P-62 to P-64	Pelitic quartzite from Mahto Formation south of McGillivray Ridge. Detrital quartz-filled *Skolithos* burrows, quartz + sericite matrix.
P-65 to P-68	Feldspathic grit from immediate hanging-wall of Chatter Creek Thrust at base of McGillivray Ridge (Middle Miette). Albite, quartz, muscovite, calcite. Sheared matrix.

P-69 to P-71	Feldspathic grit (as above) with milky quartz veining. Base of Mount Brown.
P-72 to P-73	Ankeritic marble from Murel Formation south of McGillivray Ridge Cream weathering rust, finely recrystallized.
P-74 to P-82	Pelitic limestone, ankeritic dolomite, finely recrystallized dolomitic marble from Middle Cambrian strata south of McGillivray Ridge. Generally greenish-grey and pink to mauve, weathering rust.



Appendix 1: Petrographic Survey, Sample Locations

Punch Claim Property
Golden Mining Division, B.C.
NTS 83/D8

Legend

Claim boundary

Geologic contact

Thrust fault

•P65 Sample location

Scale

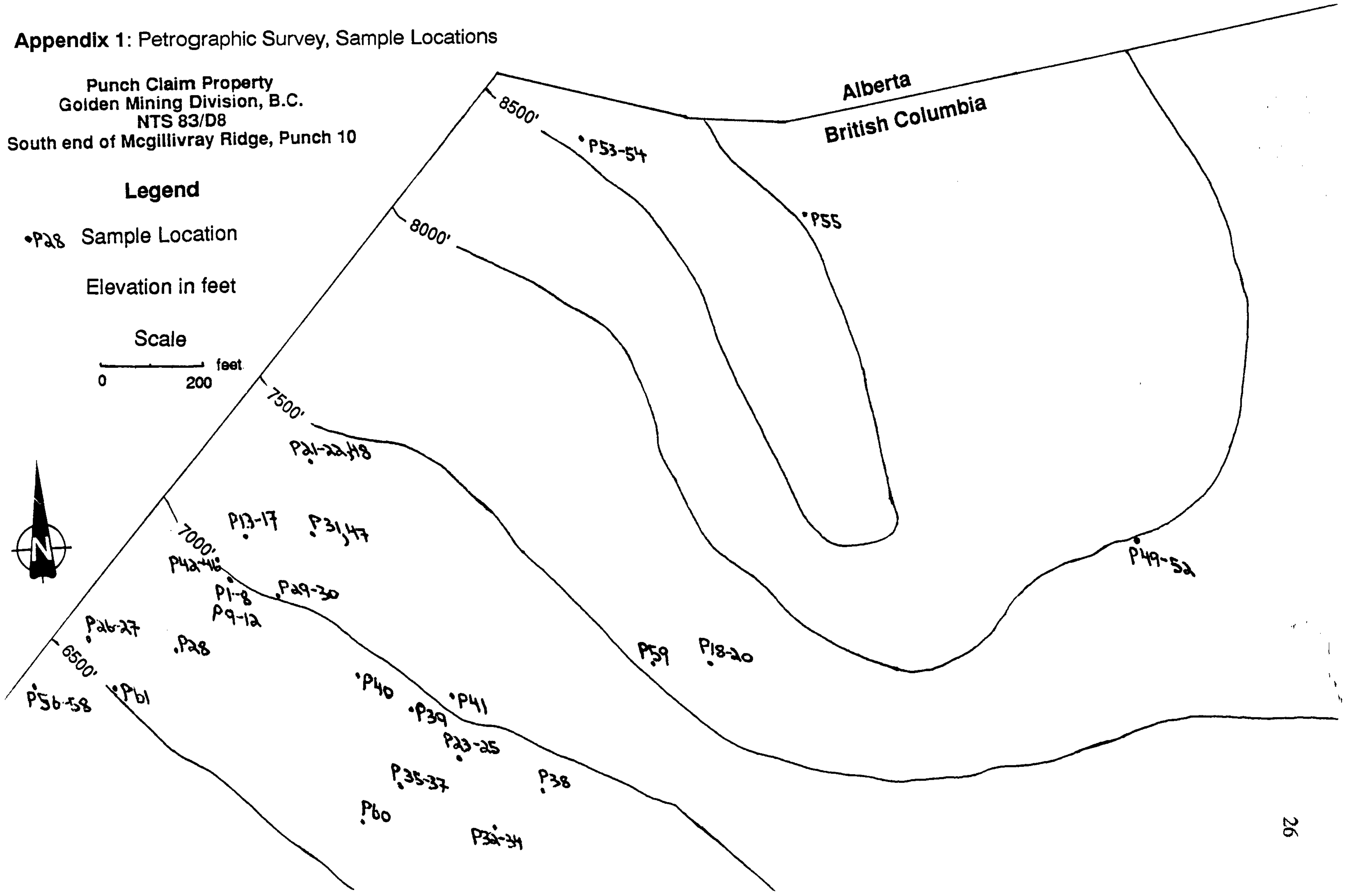
Metres 1000 0 1000 2000 Metre

Lithologic Units

MC	Middle Cambrian; carbonate, calcareous pelite
Ma	Mahto Formation; quartzite, pelite
Mu	Murel Formation; carbonate
McN	McNaughton Formation; quartzite, pelite
MG	Miette Group grit, pelite, carbonate

Appendix 1: Petrographic Survey, Sample Locations

Punch Claim Property
Golden Mining Division, B.C.
NTS 83/D8
South end of Mcgillivray Ridge, Punch 10



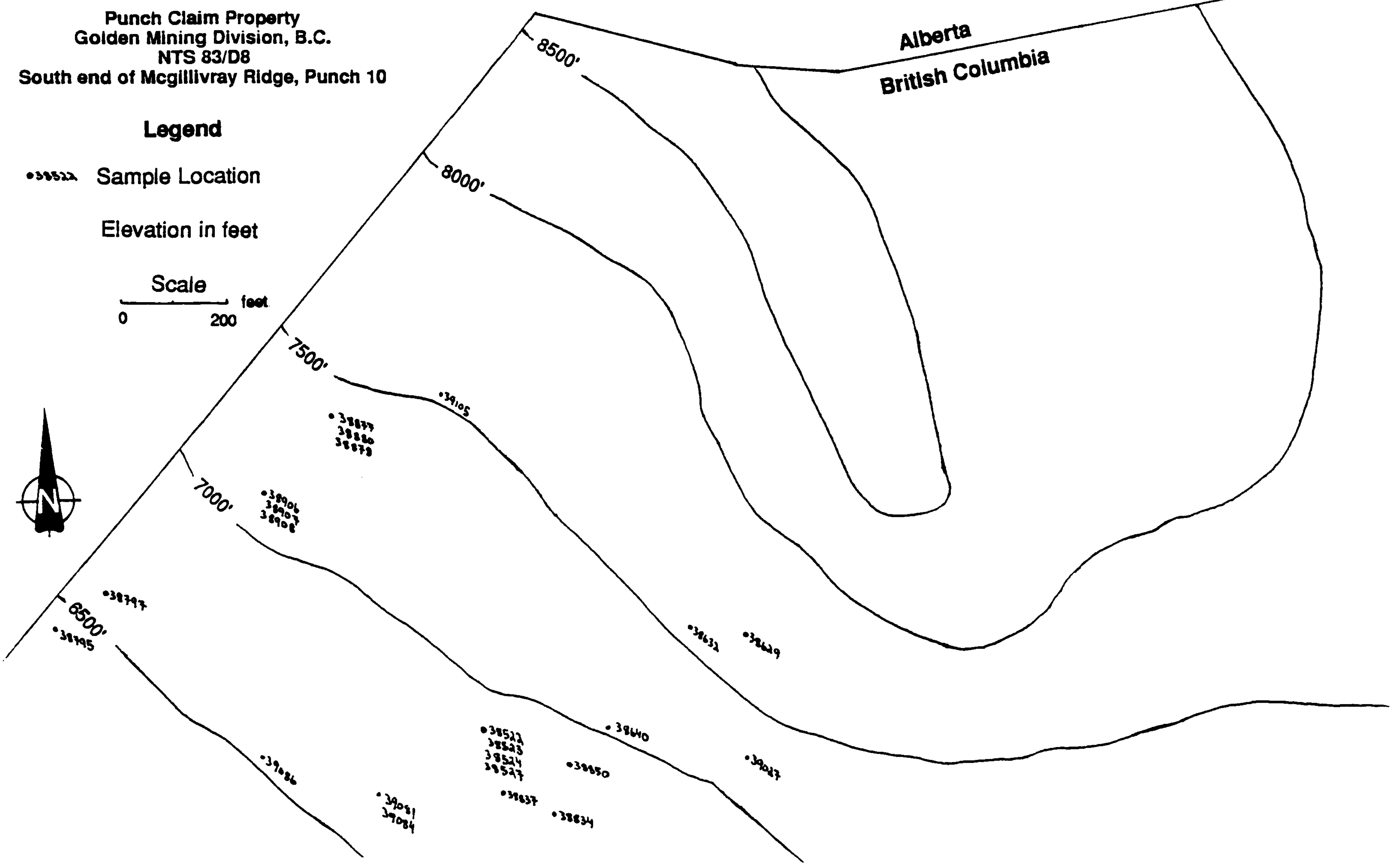
APPENDIX 2

ICPES MULTI-ELEMENTAL ANALYSES:
SAMPLE LOCATIONS, DESCRIPTIONS AND RESULTS

Sample Number	Description
38522	Well-mineralized bedding-parallel vein.
38523	Well-mineralized bedding-parallel vein.
38524	Well-mineralized bedding-parallel vein.
38527	Sparsely-mineralized bedding-parallel vein.
38529	Mylonitized quartzite.
39632	Unmineralized discordant vein.
38640	Dark grey (carbonaceous ?) pelite, unveined.
38834	Green, sericite pelite, unveined.
38837	Unmineralized bedding-parallel vein.
38850	Unmineralized bedding-parallel vein.
38795	Unmineralized bedding-parallel vein.
38797	Sparsely-mineralized discordant vein.
38877	Well-mineralized bedding-parallel vein with host pelite.
38878	Well-mineralized bedding-parallel vein.
38880	Sparsely-mineralized bedding-parallel vein.
38906	Well-mineralized bedding-parallel vein with host pelite.
38907	Sparsely-mineralized bedding-parallel vein.
38908	Sparsely-mineralized pelite from within bedding-parallel vein.
39027	Unmineralized quartzite.
39081	Unmineralized pelitic quartzite.
39084	Unmineralized quartzite.
39086	Unmineralized, matrix-supported quartz-pebble conglomerate.
39105	Unmineralized pelitic quartzite.

Appendix 2 . ICPES Trace Element Survey, Sample Locations

Punch Claim Property
Golden Mining Division, B.C.
NTS 83/D8
South end of Mcgillivray Ridge, Punch 10



ECO-TECH LABORATORIES LTD.

10041 EAST TRANS CANADA HWY.
KAMLOOPS, B.C. V2C 2J3
PHONE - 604-573-5700
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OCTOBER 7, 1988

VALUES IN PPM UNLESS OTHERWISE REPORTED

ETK#	DESCRIPTIONS	Au	AG	AL(%)	AS	B	BA	BI	CA(%)	CD	CO	CR	CU	FE(%)	K(%)	LA	MG(%)	MN	MO	NA(%)	NI	P	PB	RB(%)	SB	SN	SR	TI(%)	U	V	W	Y	ZN
360 - 9	38522	76290	.4	.32	20	2	245	(5	(.01	1	2	168	2	1.05	.26	10	.01	28	8	.02	5	40	58	(.01	(5	(20	3	(.01	(10	6	(10	(1	4
360 - 10	38523	124750	.4	.42	20	2	85	(5	.04	1	3	153	3	1.27	.31	30	.02	21	14	.02	8	120	42	(.01	(5	(20	4	(.01	(10	6	(10	1	4
360 - 11	38524	57374	08.8	.30	20	2	250	(5	(.01	1	1	204	3	1.01	.24	20	.02	29	9	.01	6	50	42	(.01	(5	(20	4	(.01	10	6	(10	(1	3
360 - 13	38527	570	.2	.12	(5	2	30	(5	(.01	(1	2	255	3	.75	.10	10	.01	42	13	.01	6	60	10	(.01	(5	(20	3	(.01	10	5	(10	(1	2
373 - 12	38629	10	.2	.31	(5	2	5	(5	.79	(1	3	206	3	.54	(.01	(10	.48	47	12	.01	5	410	2	(.01	(5	(20	18	(.01	10	5	(10	1	4
373 - 15	39632	55	.2	.07	5	(2	35	(5	.01	(1	1	285	3	.42	.05	(10	(.01	41	18	.01	5	20	16	(.01	(5	(20	4	(.01	20	4	(10	(1	2
395 - 31	38640	85	.2	.19	(5	2	25	35	.08	1	1	24	(1	2.78	.16	10	.03	16	3	.03	2	150	8	(.01	5	(20	4	.03	10	8	(10	1	5
395 - 45	38834	20	(.2	.26	(5	(2	35	(5	.01	(1	2	45	1	.35	.21	30	.02	13	2	.01	2	90	(2	(.01	(5	(20	2	(.01	(10	4	(10	1	2
395 - 48	38837	5	.2	.14	(5	2	35	(5	(.01	(1	5	90	3	3.98	.12	10	.01	48	8	.05	7	60	14	(.01	5	(20	3	(.01	10	4	(10	(1	11
395 - 61	38850	55	.2	.19	5	2	100	(5	.87	(1	3	95	2	.83	.13	10	.45	139	8	.01	4	240	8	(.01	(5	(20	25	(.01	20	4	(10	2	4
399 - 94	38795	20	.2	.20	(5	2	635	(5	(.01	(1	6	177	2	2.43	.17	10	.02	155	8	.03	6	70	8	(.01	(5	(20	15	.01	10	5	(10	1	8
399 - 96	38797	490	.2	.05	5	2	40	(5	(.01	1	2	207	3	.74	.04	(10	(.01	32	15	.01	4	30	24	(.01	(5	(20	2	(.01	10	4	(10	(1	1
421 - 10	38877	41860	.2	.11	15	2	180	(5	(.01	1	1	200	3	1.79	.10	(10	(.01	28	15	.02	4	40	10	(.01	5	(20	5	(.01	20	4	(10	(1	3
421 - 11	38878	15830	.2	.17	5	2	160	(5	.01	1	1	167	2	1.86	.16	10	.01	24	7	.02	4	60	6	(.01	(5	(20	3	(.01	10	3	(10	(1	4
421 - 13	38880	2880	.2	.11	5	2	185	(5	(.01	(1	2	156	2	1.60	.10	(10	(.01	25	6	.02	3	40	8	(.01	(5	(20	4	(.01	(10	4	(10	(1	4
421 - 39	38906	71470	.4	.07	15	(2	25	(5	(.01	1	2	172	2	.78	.06	(10	(.01	28	13	.01	5	20	28	(.01	(5	(20	1	(.01	10	4	(10	(1	2
421 - 40	38907	440	.2	.18	20	(2	60	(5	.01	1	3	119	2	1.17	.18	10	.01	28	8	.01	7	60	18	(.01	5	(20	1	(.01	10	5	(10	(1	4
421 - 41	38908	170	(.2	.21	20	2	80	(5	(.01	1	4	67	1	1.16	.20	20	.01	35	5	.02	7	40	6	(.01	(5	(20	1	(.01	10	4	(10	(1	4
422 - 2	39027	10	.2	.05	15	2	35	(5	.01	1	1	217	11	.29	.03	(10	(.01	46	16	.01	4	30	4	(.01	(5	(20	2	(.01	10	5	(10	(1	3
422 - 21	39081	30	(.2	.23	(5	4	20	(5	(.01	(1	1	225	3	.34	.16	20	.01	31	10	.01	5	30	(2	(.01	(5	(20	2	(.01	10	6	(10	(1	2
422 - 24	39084	<5	(.2	.32	(5	2	45	(5	.06	(1	1	209	2	.31	.19	10	.06	44	15	.01	5	100	(2	(.01	(5	(20	3	(.01	10	6	(10	(1	3
422 - 26	39086	40	.2	.33	(5	2	160	(5	.06	(1	2	244	3	.48	.22	20	.02	44	18	.01	5	150	2	(.01	(5	(20	12	(.01	(10	6	(10	1	2
423 - 30	39105	15	.2	.30	5	4	45	(5	.03	1	1	169	2	2.46	.19	10	.01	20	11	.03	4	130	8	(.01	5	(20	4	.01	20	12	(10	(1	4

NOTE: (= less than

Gold (Au) in ppb

ECO-TECH LABORATORIES LTD.
Frank J. Pezzotti, A. Sc. T.
B.C. Certified Assayer