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CAPOOSE PRECIOUS AND BASE METAL PROSPECT CENTRAL BRITISH COLUMBIA (93F/6E)

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INTRODUCTION

The Capoose precious and base metal prospect in central British Columbia (Figure 2-8-1) is centred at latitude 53°16′ north and longitude 125°9′ west, 2 kilometres north of Fawnie Nose and approximately 110 kilometres southeast of Burns Lake. Access is by helicopter or by four-wheel-drive road off kilometre 142 on the main Kluskus-Ootsa logging road running southwest from Vanderhoof.

The property covers a geochemical anomaly discovered prior to 1969 by Rio Tinto Canadian Exploration Ltd. Riocanex worked on the property between 1969 and 1971. Work from 1976 to 1985 by Granges Exploration Ltd. in joint venture with Bethlehem Copper Corp. and later with Cominco Ltd. has included diamond drilling totalling 13 285 metres in 85 holes.

This report is based on a two-week mapping project in the main area of mineralization, undertaken in late August and early September 1986. The project is part of an M.Sc. thesis in progress by the senior author.

REGIONAL GEOLOGY

The Fawnie Range, in the vicinity of the Capoose prospect, is a northwest-trending sequence of synclinally folded Lower and Middle Jurassic Hazelton Group rocks intruded by the Cretaceous or Tertiary granitic Capoose batholith. The area studied lies in Middle Jurassic Hazelton Group rocks in fault contact with Lower Jurassic rocks to the north and south (Tipper *et al.*, 1974). The Lower Jurassic Hazelton Group consists of andesitic to rhyolitic tuff, breccia, flows and sedimentary rocks; the Middle Jurassic Hazelton Group includes basalt, andesite, tuff, breccia, greywacke, mudstone and conglomerate (Tipper *et al.*, 1974).

Rocks of the Nechako Plateau are characterized by low-grade regional metamorphism. Contact metamorphism around plutons is pronounced (Tipper, 1963). Although the deformation of the rocks is not generally intense, Tipper (1963) suggests that commonly featureless volcanic rocks may mask complex fold patterns.

The Hazelton Group is characterized by open folding with dips up to 45 degrees. In the vicinity of the Capoose prospect, rocks are synclinally folded; the axis of the syncline trends northwest and passes 5 kilometres northwest of the centre of the study area.

LOCAL GEOLOGY

STRATIGRAPHY

Detailed mapping at a scale of 1:2500, and core logging of a representative cross-section on the Capoose property, has defined 10 map units in the main area of mineralization (Figure 2-8-1). The map units are divided into four assemblages: a lower mafic volcanic package (Unit 1), a central volcaniclastic package (Units 2 to 5), an upper felsic volcanic package (Units 6 to 8), and an intrusive package (Units 9 and 10). Principal lithologic units are shown in Figure 2-8-1 and described in detail following.

Lower mafic volcanic package, Unit 1, is typically massive and locally scoriaceous basaltic andesite. Some interflow conglomerate, with felsic, altered felsic and dark basalt fragments, is included in the unit which crops out in the northeast part of the map area. Locally, stretched amygdules (2 by 1 centimetre) are infilled mainly by calcite and quartz and have a northeasterly elongation. The unit is propylitized as evidenced by the abundant replacement of mafics by chlorite, the calcite-quartz amydules and calcite veinlets (1 to 2 millimetres wide) that cut the unit.

Central volcaniclastic package, Units 2 to 5, lies conformably above the basaltic andesites and consists of felsic lapilli tuffs interbedded with dacite flows, argillite, and lithic wacke. Felsic lapilli tuff, Unit 2, has a pale grey aphanitic groundmass which supports varying amounts of clasts 1 to 10 millimetres across. Devitrification has resulted in aphanitic and poorly formed spherulitic fabrics. A dacite flow, Unit 3, in the northeastern part of the study area, shows conformable contacts with bedding in adjacent lithic wacke and felsic lapilli tuff. This unit looks like andesite in hand specimen, but in thin section is seen to contain 1 per cent anhedral embayed quartz crystals. Thinly bedded argillite and ash tuff, Unit 4, outcrops in the central portion of the area. Tuff beds range from 1 to 5 centimetres thick and are interbedded with argillite every 10 centimetres within the sequence. Indicators of tops, such as graded bedding, load casts, rip-up clasts and pull-apart structures, show the section to be right-side-up. The lithic wacke, Unit 5, is poorly sorted with approximately 60 per cent matrix and rock fragments, 20 per cent feldspar grains and 20 per cent quartz grains. Rocks of this composition are chiefly volcanic sandstones formed by direct reworking of pyroclastic material. Discontinuous beds of sandy limestone pinch and swell in outcrop. Locally this unit contains abundant fossils, some of which have been identified by H. Frebold (Tipper, 1963: No. 4 GSC Locality 20116-2, 4 kilometres from north end of Fawnie Nose) as ***Belemnites***, species indeterminate, and *Rhynchonella*, species indeterminate. Unfortunately, only a broad Jurassic to Cretaceous age can be inferred for these fossils.

Upper felsic volcanic package, Units 6 to 8, conformably overlies the central volcaniclastic package. It is characterized by a sequence of flow-banded, spherulitic, garnetiferous quartz rhyolite and rhyolite flows with interbedded recessive-weathering, fossiliferous lithic wackes. A quartz garnet rhyolite flow, Unit 6, is characterized by 7 per cent embayed quartz phenocrysts (1 to 2 millimetres across) and 3 per cent anhedral garnet crystals in a devitrified aphanitic felt-textured groundmass. The garnets are occasionally zoned, exhibit weak birefringence, are intergrown by muscovite and are rimmed by muscovite and quartz. Garnet rhyolite, Unit 7, is commonly flow banded and contains spherulite-like balls (1 to 3 centimetres in diameter). Lithophysae, seen in thin section, are often lined with quartz. This unit has 5 per cent anhedral garnets interwoven with quartz aggregates and surrounded by a felt-textured aphanitic groundmass. Rare tourmaline, associated with garnet, has been noted in thin section. Rhyolite, Unit 8, is predominantly aphyric. However 1 to 2 per cent anhedral garnet crystals are associated with rare spherulite-like balls, 5 to 30 centimetres in

British Columbia Ministry of Energy, Mines and Petroleum Resources, Geological Fieldwork, 1986, Paper 1987-1.

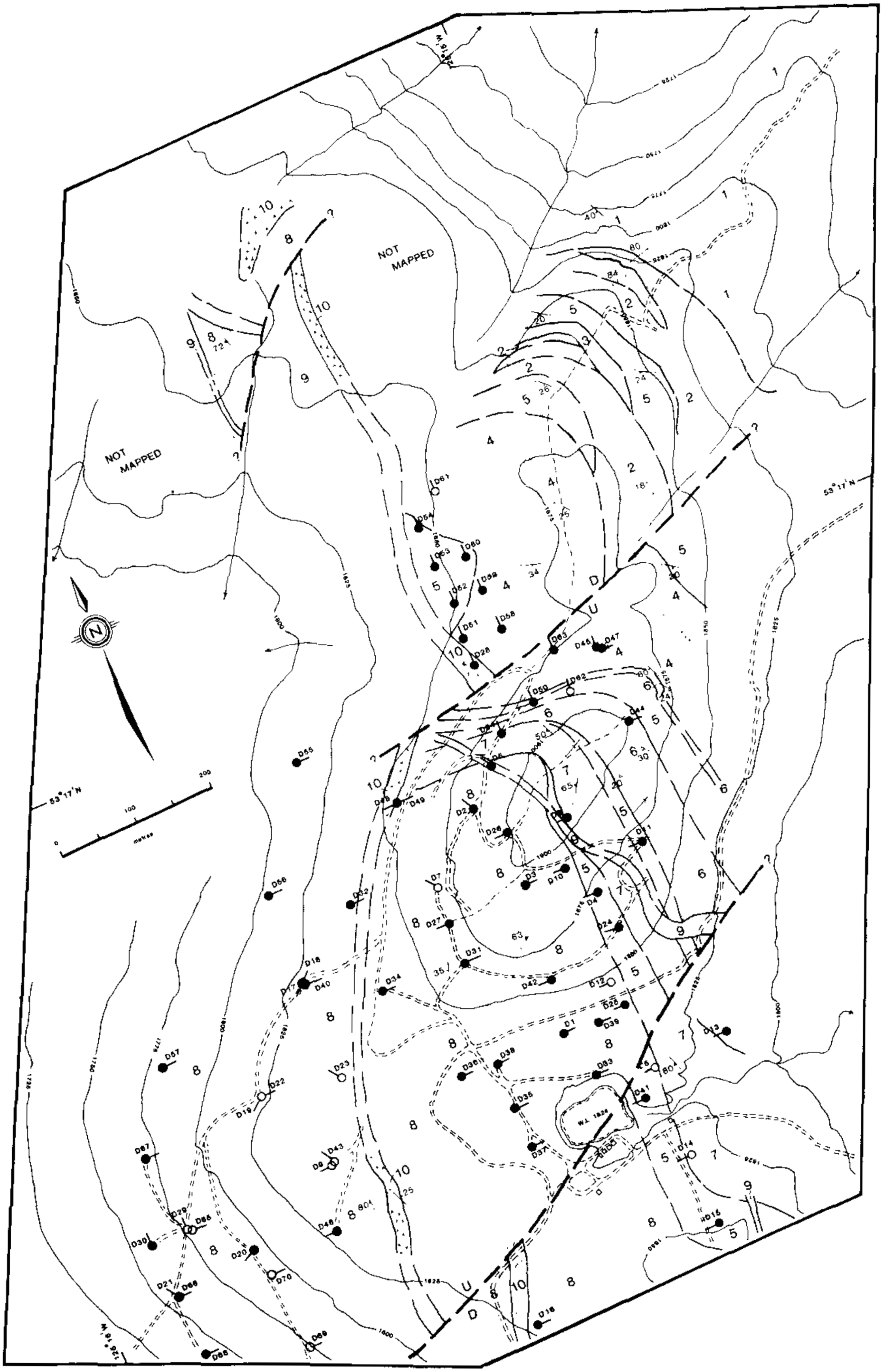

Figure 2-8-1. Geology of the main mineralized zone, Capoose base and precious metal prospect, central British Columbia. **Lower mafic volcanic package**: 1 = basaltic andesite with interflow conglomerate; **central volcaniclastic package**: 2 = felsic lapilli tuff, 3 = dacite flow, 4 = thinly interbedded argillite-ash tuff, 5 = lithic wacke with minor conglomerate and sandy limestone; **upper felsic volcanic package**: 6 = quartz garnet rhyolite flow; 7 = garnet rhyolite flow, 8 = rhyolite; **intrusive package**: 9 = quartz garnet porphyry, 10 = felsite. (Note: solid drill holes indicate where information was available; open drill holes indicate no available information).

diameter close to autobrecciated zones in the rhyolite. Flow banding is common in Unit 8. Most of the unit is sericitized and disseminated pyrite is common.

Conformity between lower, central and upper packages is evident from field relationships. Although flow banding within the rhyolite units is markedly variable, it generally parallels the argillite-rhyolite contact. Measurements of columnar jointing in the rhyolite flows (Figure 2-8-1) substantiate a conformable relationship between the upper and central packages, as does continuity of the interbedded lithic wacke unit between them. The interbedded volcanic-sedimentary succession (Units 1 to 8) represents a marine basin with deposits of fine muds and sands interlayered with flows, tuffs, and breccias which covered most of the Nechako Plateau in Early Jurassic time (Tipper, 1963).

Intrusive package, Units 9 and 10, consists of two crosscutting units: a quartz garnet porphyritic dyke (Unit 9) and a felsite dyke (Unit 10). Unit 9 dips shallowly to the southwest and is characterized by 1 per cent anhedral garnet and 5 per cent corroded quartz crystals in a matrix of equigranular quartz and feldspar. The rims of quartz and muscovite surrounding garnets are less distinct than in the older rhyolite units. Unit 10 crosscuts stratigraphy and appears to dip steeply to the east (Figure 2-8-1). At surface, the cream-coloured unit appears as a platy rubble subcrop (denoted by crosses in Figure 2-8-1). In thin section devitrification is represented by an aphanitic groundmass and microspherulites. Much of the unit is kaolinized and sericitized.

STRUCTURE

Detailed mapping of the northeastern limb of the syncline on Fawnie Range shows units dipping 20 to 40 degrees to the southwest. Measurement of cleavage-bedding intersections in the argillite-tuff and steeply dipping A-C joint surfaces in felsic tuffs and dacites indicates that the synclinal fold axis plunges gently (10 degrees) toward the southeast.

East-west faults are the predominant regional structures in the area. Fault traces are marked by linear depressions on Fawnie Range (Schroeter, 1981). Detailed mapping has defined two northeast-trending dip-slip faults which cut all map units (Figure 2-8-1). The two faults appear to mark the boundaries of a minor horst.

METAMORPHISM

Hornfelsic argillite tuff, recrystallized limestone, and possibly porphyroblastic garnet in rhyolite suggest contact metamorphism probably related to the Capoose batholith lying to the west of the property. Potassium-argon dating of this pluton is in progress.

ALTERATION

Much of the felsic volcanic package has been pervasively kaolinized and sericitized. Abundant quartz veining was not observed. The intensity of phyllic alteration has been mapped qualitatively and shown in Figure 2-8-2. Zones of high or intense phyllic alteration generally correspond with mineralized areas outlined by diamond drilling. The limit of hornfelsic alteration in argillite and lithic wacke is estimated in Figure 2-8-2. The alteration is being dated.

Rims of quartz and sericite are observed around garnets in the rhyolite units. Primary, porphyroblastic or xenocrystic origin for these garnets has yet to be established.

Epidote and chlorite are common alteration products in the andesitic rocks. These rocks are marginal to the deposit area and this may represent regional greenschist metamorphism rather than peripheral propylitization.

MINERALIZATION

Church and Diakow (1982) delineated a broad silver lithogeochemical anomaly near Capoose Lake which coincides with locally high values for lead discovered in 1970 by Rio Tinto Canadian Exploration Ltd. Three zones of precious and base metal mineralization have been identified on the property (Schroeter, 1981); two are hosted by garnetiferous rhyolite, the third by hornfelsed argillite.

Only core from zones 1 and 2, within the garnetiferous rhyolite, was examined in 1986. These zones are typified by galena, pyrite, pyrrhotite, chalcopyrite, arsenopyrite and sphalerite occurring mainly as disseminations and sometimes as veinlets. Some replacement of garnets by pyrite was also seen. Tetrahedrite, pyrargyrite, electrum, native gold and cubanite have been observed by Granges Exploration Ltd. Silver and minor gold (ratio 280:1) are associated with the galena and sphalerite (Schroeter, 1981). Sulphides commonly occur adjacent to and intergrown with garnet. The best intersections in drill core are: 126 metres grading 0.38 gram per tonne gold and 55.1 grams per tonne silver in zone 1; and 99 metres grading 0.25 gram per tonne gold and 51.3 grams per tonne silver in zone 2. Intercepts are core lengths, not true widths.

The Capoose prospect is a low-grade "bulk silver" deposit. Church and Diakow (1982) have noted that the deposit type might be either porphyry or volcanogenic. Potassium-argon and galena lead isotope dating, fluid inclusions, oxygen isotopes, petrochemistry trace element analyses and garnet mineralogy currently being done at The University of British Columbia will help to define a genetic model for the deposit.

CONCLUSIONS

A unique combination of lithologies, textures, and mineralization is seen at Capoose. Some of the unusual features on the property include: garnet-rich rhyolites with alteration rims of quartz and muscovite; spherulite-like balls up to 30 centimetres in diameter occurring close to autobrecciated zones in rhyolite; belemnites in lithic wacke formed by reworking of pyroclastic materials. The origin of the garnet in rhyolite is important to developing an understanding of the genesis of the deposit. The intensity of pervasive phyllic alteration appears to be directly related to significant zones of precious metal mineralization. Although host lithologies appear to be Middle Jurassic, alteration and accompanying mineralization are not necessarily coeval.

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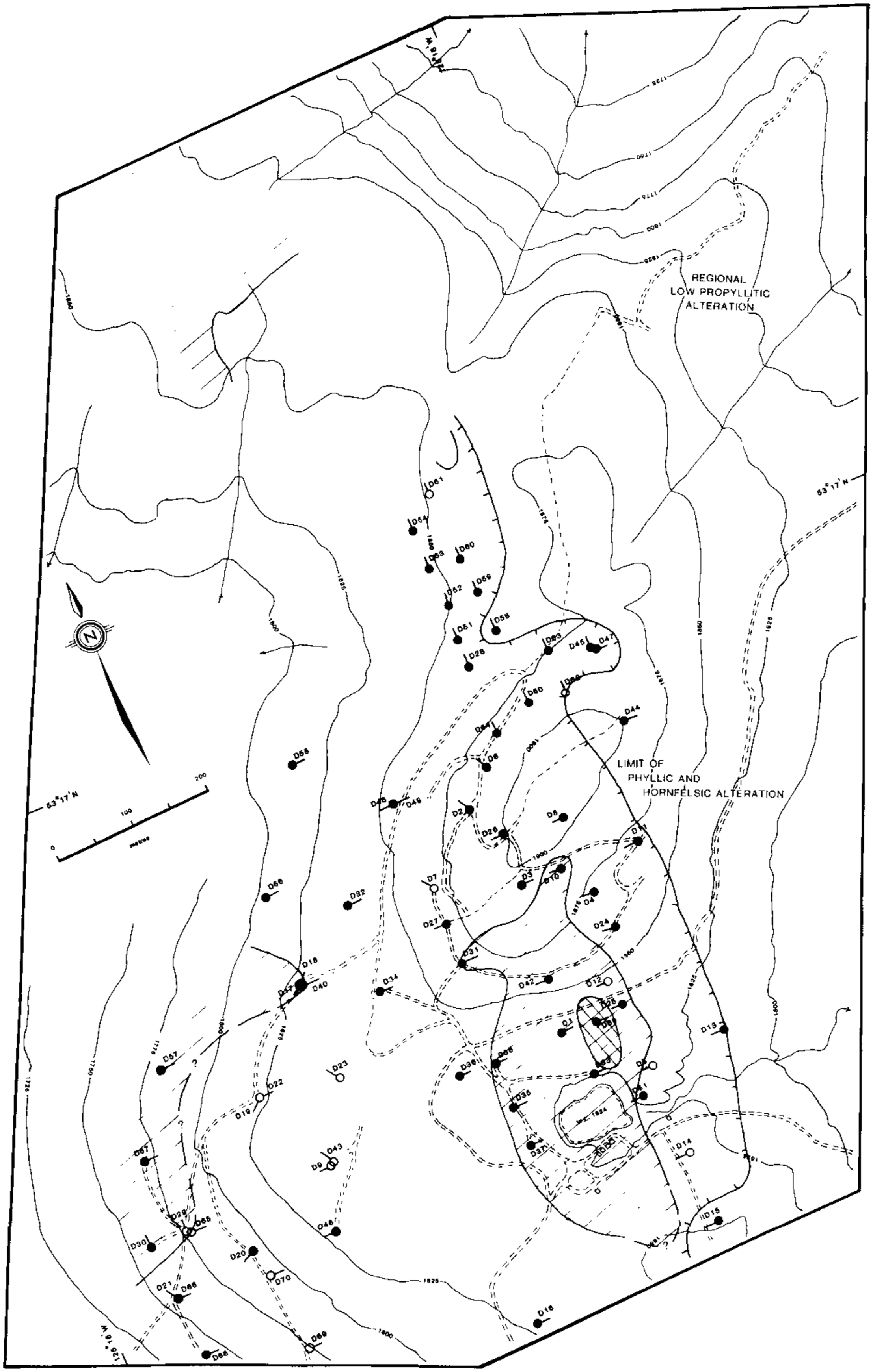

Figure 2-8-2. Qualitative alteration map of the main mineralized zone, Capoose base and precious metal prospect, central British Columbia. Zones of high phyllic alteration are indicated by hatched lines; intense phyllic alteration is indicated by crosshatching. Hornfelsing is observed in argillites and lithic wacke units (*see* Figure 2-8-1). Limit of hornfelsing and phyllic alteration is represented by heavy line with ties toward alteration. Propylitic alteration may be related to regional low-grade greenschist metamorphism rather than to propylitization peripheral to mineralization. (Note: solid drill holes indicate where information was available; open drill holes indicate no available information).