



Vancouver Petrographics Ltd.

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Nov. 6, 1989
 Our file #8578

Dear Mr. Glatiotis: Re: Petrographic study, samples 89S01, 05,
 06, 07, 09.

As requested a petrographic study was made of the five (5)
 samples listed above. The results of the analyses are summarized
 as follows:

89S01

Mineralized composite brecciated quartz vein.

Quartz crystals have grown outwards into open cavities from fine
 quartz-sulphide-rich cores. Dark colour results from finely
 divided sulphides. Abundant open quartz-lined cavities which
 also contain disseminated sulphides. K-feldspar absent.

Sulphides are predominantly fine, partially oxidized pyrite-
 marcasite grains. Gold bearing.

89S05

Composite, cyclic layered quartz-K-feldspar and quartz vein cut
 by diffuse veinlets of late quartz filling open spaces.

Cyclic layers of early fine granular quartz and intermingled K-
 feldspar which are clouded by impurities or an alteration
 dusting. From this base quartz crystals project outwards to fill
 or partially fill open space. This cycle is repeated many times.

Sericite clusters and associated carbonate fill spaces among
 quartz-K-feldspar grains. Argillic component is suspected in hand
 specimen; not confirmed in thin section.

Opaques; no sulphides, traces of gold/electrum (?)

89S06

Composite, cyclic layered quartz-K-feldspar and quartz vein,
 veined by later quartz.

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Cyclic layers of early fine granular quartz and intermingled K-feldspar which are clouded by impurities or an alteration dusting. Possible very minor argillic material. From this base quartz crystals project outwards to fill or partially fill open space. This cycle is repeated many times.

Early quartz fine granular, differs from 89S05 by containing less impurities, intermingled with K-feldspar which is clouded by impurities or alteration dusting. Sericite clusters fill spaces among quartz-K-feldspar grains. Carbonate was not detected.

The cyclic composite vein is cut by a late composite quartz veinlet <1cm wide.

Opagues; 2%, pyrite/marcasite.

85S07

Brecciated quartz, healed by later stage quartz, and subsequently veined.

Breccia fragments of very fine quartz with a microgranular argillic(?) red brown and lesser black opaque dusting. These fragments are in a very fine granular quartz matrix which also has an opaque dusting. The rock was subsequently refractured, and veined by coarse grained quartz, accompanied by minor sericite and opaques, forming diffuse networks, filling open spaces and forming composite veins. No K-feldspar observed.

Opagues <5%, pyrite/marcasite.

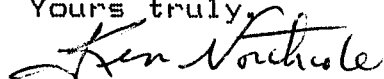
89S09

Composite layered quartz (K-feldspar, sericite) vein.

Composite layered quartz vein with layered irregular quartz grains aligned perpendicular to layering. Dusted by impurities. Some intermixing with K-feldspar also dusted by impurities in diffuse clots concentrated near the base of successive quartz layers. Sericite clusters are scattered among quartz and K-feldspar grains. Sericite is particularly abundant in the quartz rich open space portions of successive layers where microgranular opaque material is also concentrated. Argillic alteration locally among quartz and K-feldspar grains.

Opagues; microgranular material in cavities associated with minor irredescent grains. Trace gold.

Yours truly,



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89501

Mineralized composite brecciated quartz vein.

Quartz crystals have grown outwards into open cavities from fine quartz-sulphide-rich cores. Dark colour results from finely divided sulphides. Abundant open quartz-lined cavities which also contain disseminated sulphides. K-feldspar absent.

Sulphides are predominantly fine, partially oxidized pyrite-marcasite grains. Gold bearing.

Stained slab does not indicate presence of K-feldspar.

Transmitted light

Gangue: 90%

Quartz; subhedral/anhedral, (<.05 to >2.5 mm, generally >1 mm), as radiating subhedral grains growing outwards from a mineralized vuggy finer granular quartz-sulphide mineralized base filling open space.

Microgranular dusting occurs at the base of quartz grains and at terminations of some grains in open spaces. Associated with mineralization.

Reflected light

Opagues: 10%

Pyrite; subhedral, (<.01 to 0.1 mm), aggregates of grains to several mm. Margins of grains and clusters of grains have granular etching which extends inwards into the cores of some grains as a dull dusted appearance. Contain abundant laminae of unaltered pyrite. Contains irregular blebs of marcasite.

Marcasite; 2%, anhedral, (<.01 to 0.1 mm), as irregular grains or blebs in or at the margins of pyrite. Pale greenish tint as compared to pyrite. Anisotropic.

Native gold; traces, anhedral (<.0025 to .0125 mm)

(a) cluster of 4 grains within .025 mm, (.002 to .0125 mm). Large grain at edge of pyrite grain. Two grains in incipient fracture in pyrite. One grain in pyrite with no obvious fracture relationship.

(b) single grain, anhedral (.0125 mm), irregular "C" shape in pyrite. No obvious fracture relationship.

Composite, cyclic layered quartz-K-feldspar and quartz vein cut by diffuse veinlets of late quartz filling open spaces.

Cyclic layers of early fine granular quartz and intermingled K-feldspar which are clouded by impurities or an alteration dusting. Distinguishable in section by RI quartz > K-feldspar. Possible very minor plagioclase and/or argillic material. From this base quartz crystals project outwards to fill or partially fill open space. This cycle is repeated many times.

Sericite clusters and associated carbonate fill spaces among quartz-K-feldspar grains. Argillic component is suspected in hand specimen; not confirmed in thin section.

Stained slab, confirms diffuse K-feldspar clots in fine quartz groundmass. Etched interstitial patches may be plagioclase or argillic material. Unetched quartz conspicuous. Opaques; no sulphides, traces of gold/electrum (?)

Transmitted light

Quartz; 70%, anhedral/subhedral, (<.05 to 0.3 mm).

(a) Early fraction: irregular interlocking grains. Clouded with impurities. Intermixed with K-feldspar, distinguishable by RI quartz (+) > K-feldspar, (-).

(b) Late fraction; irregular veinlets, open space filling, coarser subhedral grains. Less clouding by impurities.

K-feldspar; 25%(?), anhedral, (<.05 to 0.3 mm). Irregular interlocking grains intermingled with quartz. Clouded by microgranular dusting (alteration?, impurities). Confirmed in stained slab.

Sericite; <5%, anhedral, (<.01 to .05 mm), as radiating/felted clusters of grains with carbonate interstitial to quartz and K-feldspar. Parallel extinction.

Carbonate; 1%, anhedral, (<.05 to 0.1 mm), irregular grains interstitial to quartz and K-feldspar. In localized interstitial clusters of grains.

Note: Etched patches visible on stained slab were not observed in thin section. Suspect argillic material (or possible plagioclase). No twinning was observed. Very fine, untwinned plagioclase with an alteration/impurity dusting would be virtually indistinguishable from K-feldspar in this section.

89505 Continued

Reflected light

Negligible sulphides.

Native gold; traces (6 grains), anhedral, (.01 to .02 mm), isolated grains in quartz gangue. Poor polish, high reflectivity.

(a) Single grain embedded in quartz near outer margin of grain (0.01 mm)

(b) Single grain at contacts between quartz grains (0.01 mm)

(c) Single grain at contact between two quartz grains (0.02 mm)

(d) Two grains, 0.025 mm apart at contacts between quartz grains. Both 0.01 mm).

(e) Single grain, irregular "s" shape in sericite (0.0125 mm)

Electrum (?); trace, (1 grain), (.005 mm), in quartz gangue.

89S06

Composite, cyclic layered quartz-K-feldspar and quartz vein, veined by later quartz.

Cyclic layers of early fine granular quartz and intermingled K-feldspar which are clouded by impurities or an alteration dusting. Distinguishable in section by RI quartz > K-feldspar. Possible very minor plagioclase and/or argillic material. From this base quartz crystals project outwards to fill or partially fill open space. This cycle is repeated many times.

Early quartz fine granular, differs from 89S05 by containing less impurities, intermingled with K-feldspar which is clouded by impurities or alteration dusting. Distinguishable in section by differences in amount of impurities and RI quartz (+) > K-feldspar (-). Sericite clusters fill spaces among quartz-K-feldspar grains. Carbonate was not detected.

The cyclic composite vein is cut by a late composite quartz veinlet <1cm wide.

Stained slab, confirms diffuse K-feldspar clots in fine quartz groundmass. No etched plagioclase observed. Unetched quartz conspicuous. Opaques; 2%, pyrite/marcasite. Predominantly in late cross cutting composite quartz veinlet. Traces disseminated in composite cyclic vein groundmass.

Transmitted light

Composite vein groundmass:

(a) Early fraction; (basal portion of cyclic layers).

Quartz; 30%, anhedral/subhedral, (<.05 to 0.3 mm), irregular interlocking grains. Partial clouding by impurities. Intermixed with K-feldspar, distinguishable by RI quartz (+) > K-feldspar (-).

K-feldspar; 25%, anhedral, (<.05 to 0.3 mm), irregular interlocking grains. Partial clouding by impurities (alteration?). Intermixed with quartz, distinguishable by RI quartz (+) > K-feldspar.

Sericite; 2%, anhedral, (<.01 to 0.05 mm), as radiating/felted clusters of grains, interstitial to quartz and K-feldspar. Mottled by brownish dusting.

Argillic alteration; suspected with K-feldspar base of cyclic layers. Not confirmed in thin section.

89506 Continued

(b) Late fraction (distal portion of cyclic layers)

Quartz; 30%, subhedral, (to 0.5 mm), coarser crystals, random orientation but some tendency to project outwards from basal portion. Less clouding by impurities.

Sericite; 3%, anhedral, (<.01 to 0.05 mm), as radiating/felted clusters of grains interstitial to quartz. Mottled by brownish dusting.

Late vein:

Quartz; composite, subhedral/euhedral crystals (to >1.0 mm), forming composite layers growing inwards from the vein walls. Clear crystals with very localized dustings of impurities. Very minor associated opaques.

Reflected light

Opaques 2 %

(a) In Late composite quartz veinlets.

Pyrite/marcasite; <2%, anhedral/subhedral, (<.01 to 0.4 mm), aggregates of grains. Intergrowths of cream-yellow isotropic pyrite and pale yellowish white, strongly anisotropic marcasite.

Hematite(?); most composite pyrite/marcasite grains rimmed by iron oxide which appears dark grey to black with brownish orange internal reflections. Visible in hand specimen.

Note: medium grey material in fractures and in cores of pyrite grains may include minerals other than hematite. Not all gave internal reflections of hematite. Requires probe analyses in view of the number of anticipated Ag-bearing minerals which are shades of grey in colour.

Gold(?); traces, anhedral, (<.015 mm), irregular grain, very poor polish, reflectivity low for gold.

(b) Groundmass quartz

Unidentified "A"; traces, anhedral, (0.02 to 0.05 mm), irregular grains, silvery grey very poor polish. Anisotropic dark bluish purple/reddish tint.

85507

Brecciated quartz, healed by later stage quartz, and subsequently veined.

Breccia fragments of very fine quartz with a microgranular argillic(?) red brown and lesser black opaque dusting. These fragments are in a very fine granular quartz matrix which also has an opaque dusting. The rock was subsequently refractured, and veined by coarse grained quartz, accompanied by minor sericite and opaques, forming diffuse networks, filling open spaces and forming composite veins.

Stained slab shows no K-feldspar. Opaques <5%, pyrite/marcasite.

Transmitted light

Quartz breccia; 90%

(a) Breccia fragments;

Quartz; anhedral, (<.01 to .02 mm), very fine interlocking diffuse grains. Scattered coarse grains to 0.05 mm. Light brown microgranular dusting of argillic alteration(?) throughout fragments. Also lesser dusting of microgranular to very fine grained opaques.

(b) Matrix among fragments;

Quartz; anhedral, (<.01 to .05 mm), similar in texture to fragments, coarser average grain-size, interlocking diffuse grains. Lacks light brown dusting but has the lesser dusting of microgranular to very fine grained opaques.

(c) Late segregations/veins

Quartz, anhedral/subhedral, (<.05 to 0.25 mm), interlocking grains forming a diffuse network throughout the groundmass, filling open cavities and forming composite veins.

Sericite; 5%, anhedral, (<.01 to 0.05 mm), fibrous/bladed, radiating clusters. In open spaces and among quartz crystals in late segregations/veins. Some associated iron staining.

Disseminations:

Sericite/argillite(?), <5%, anhedral, (<.01 to .01 mm), very fine dusting throughout breccia fragments and quartz matrix among fragments.

85S07 Continued

Reflected light

Opaques; <5%, disseminated throughout matrix, in coarse quartz segregations, veinlets and composite veins.

Pyrite/marcasite

(a) Pyrite; as widely disseminated fine grains (<.01 to .05 mm) throughout matrix among breccia fragments and to a lesser extent in breccia fragments.

(b) Pyrite; as diffuse clusters of fine grains (<.01 to 0.1 mm), forming diffuse clots in matrix in close proximity to coarser quartz segregations.

(c) Pyrite/marcasite in coarser quartz segregations, subhedral grains (0.1 to >0.5 mm) clustered to form aggregate grains (to several mm). The coarser composite grains have etched outer margins and internal zoning boundaries.

Composite layered quartz (K-feldspar, sericite) vein.

Composite layered quartz vein with layered irregular quartz grains aligned perpendicular to layering. Dusted by impurities. Some intermixing with K-feldspar also dusted by impurities in diffuse clots concentrated near the base of successive quartz layers. Sericite clusters are scattered among quartz and K-feldspar grains. Sericite is particularly abundant in the quartz rich open space portions of successive layers where microgranular opaque material is also concentrated. Argillic alteration locally among quartz and K-feldspar grains.

Stained slab confirms K-feldspar enrichment at the base of successive quartz layers. Opaques; microgranular material in cavities associated with minor iridescent grains. Trace gold.

Transmitted light

Quartz; 70%, anhedral/subhedral, (<.05 to 0.4 mm), aggregates of grains forming successive layers with grains oriented perpendicular to layering. Dusted by impurities. Quartz at the base of each layer is finer grained intermixed with K-feldspar as confirmed by stained slab. The tops of the layers show coarse grain-size, open space filling, and are relatively enriched in interstitial sericite and opaque dustings. Superimposed lineation transects quartz and K-feldspar producing an outward radiating texture.

K-feldspar; 20%, anhedral, (<.05 to 0.3 mm), diffuse clusters of grains intermixed with quartz. Concentrated at the base of successive quartz layers. Dusted by impurities. Shows outward radiating texture. Distinguishable from quartz by RI quartz (+) > K-feldspar (-). Confirmed by stained slab.

Sericite; 10%, anhedral, (<.01 to 0.1 mm), irregular grains, acicular/bladed, radiating clusters interstitial to quartz and sericite. Occur throughout the layers but show concentration in the quartz rich, open space, outer portions of the layers.

Argillic mineral; 10%, anhedral, (<.01 to 0.1 mm), irregular grains interstitial to quartz and K-feldspar. Enhances radiating texture superimposed on quartz.

Reflected light

Sulphides nil; with exception of microgranular opaque material in cavities with traces of associated iridescent grains. Oxidized remnants of sulphides (?).

Gold; trace

(a) irregular grain, (.0125 mm), in general groundmass at grain boundaries