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LORRAINE

Your file Votre référence

Our file Notre référence

Mr Jack Marr
Kennecott Canada Inc.
138-200 Granville St.
Vancouver BC V6C 1S4

June 1/92

Dear Jack

I have reviewed Craig Letch's petrographic report on LORRAINE, and examined the suite of thin and polished sections in a cursory manner.

Notable is the presence of melanite a Ti-rich andradite garnet commonly found in sodic igneous rocks. Cliff Stanley found it at Galore Ck and at Rugged Mtn to the north. Andre Panteluyer found it at QR. It is either magmatic or high temperature metasomatic, and may indicate early mineralization (magnetite - chalcopyrite - opatite) of a magmatic character. I suspect that melanite may be a characteristic mineral of this class of alkaline porphyry Cu (\pm skarn) mineralization.

Best regards

Ken Dawson

Canada

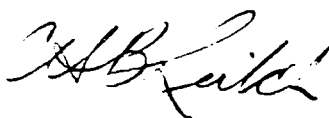
Monzonite (91-6 31.75; 91-7 173.70; 91-8 68.50) with K-feldspar to reconstructed total feldspar between 35 and 65% and similar mafics to the syenites.

Monzodiorite (91-2 10.25; 91-7 107.65; 91-8 32.55; 91-9 80.90) with K-feldspar to reconstructed total feldspar less than 35% and similar mafics to the syenites.

"Alkali gabbro" (91-3 99.30; 91-7 72.25, 100.52; 91-11 11.65, 53.15) composed of euhedral clinopyroxene, mainly aegirine-augite that is porphyritic in places and biotite, with minor interstitial (or poikilitic- to ophitic-textured) K-feldspar and accessory magnetite and apatite.

"Pyroxenite" (91-7 204.45; 91-12 6.60, 34.70, 52.00) composed essentially of euhedral pyroxene similar to that in the "gabbros" and biotite plus abundant magnetite ± ilmenite and apatite.

There is a reasonably close association in most samples between magnetite (and apatite?) and copper sulfides, and a lack of correlation between alteration and copper suggesting that at least part of the mineralization is magmatic or late-magmatic in character. In some samples, particularly those where the major sulfides are chalcopyrite and/or pyrite rather than bornite-chalcocite-digenite, magnetite is oxidized to hematite, and the sulfides are associated with silicate alteration (mainly to green biotite rather than a chlorite, and sericite-epidote carbonate). This suggests a possible second introduction of mineralization during hydrothermal alteration, although it could be merely due to remobilization of existing mineralization. Note that in spite of the abundant K-feldspar in most of these rocks, there is no evidence to suggest that even that where it is rarely found along fractures (and therefore secondary) it is associated with mineralization. Three samples that have suffered extensive quartz-sericite-carbonate (ankerite to dolomite) alteration (91-4 11.70 and 42.60; 91-5 18.60) have no associated sulfides.



Craig H.B. Leitch, Ph.D, P. Eng.

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**PETROGRAPHIC REPORT ON 45 SPECIMENS FROM THE LORRAINE
PORPHYRY CU-AU PROPERTY, BRITISH COLUMBIA**

Report for:
Sandra Bishop,
Kennecott Canada Inc.
138-200 Granville Street
Vancouver, B.C.
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Invoice attached
January 5, 1992

Samples submitted: DDH core from holes L91-2 to 12; see attached list for details.

SUMMARY:

This is a suite of medium- to coarse-grained plutonic rocks of rather unusual alkali-rich (sodio) composition: mainly relatively leucocratic biotite-pyroxene syenites to lesser monzodiorites, ranging to what might be termed "alkali gabbros" (colour index 60-80) to pyroxenites ("ultramafic" rocks) with colour index 85-96. The main minerals throughout are K-feldspar, clinopyroxene (apparently sodic augite to aegirine-augite), biotite, variable (almost always altered) plagioclase and accessory magnetite and apatite; quartz is virtually absent in these rocks. Alteration is principally to a green (?ferrous) biotite, clay-sericite, muscovite, epidote, and minor carbonate, and is accompanied in places by a suite of sulfides varying from high-Fe, low-Cu (pyrite, chalcopyrite) to low-Fe, high-Cu (bornite, chalcocite, digenite). In places magnetite is oxidized to specular hematite in association with this mineralization. An unusual dark-colored Ca-Fe garnet (?melanite, found only in soda-rich igneous rocks such as syenites) appears in some samples (91-5 41.75, 80.38; 91-7 27.30; 91-10 36.80, 55.10, 56.15).

The rocks are classed in more detail below:
Biotite-pyroxene syenite (91-2 41.75, 76.70; 91-4 11.70, 42.69, 54.35, 75.80, 166.75; 91-5 18.60, 41.75, 57.80, 80.38; 91-6 14.60, 75.40,; 91-7 27.30, 40.18; 91-9 36.45, 125.90; 91-10 36.80, 55.10, 56.15, 109.00, 123.85; 91-11 65.80, 116.10; 91-12 56.20). Composed of major coarse microperthitic orthoclase and lesser microcline, eu- to subhedral clinopyroxene and lesser biotite, with accessory magnetite and apatite. Textures vary from igneous breccia (91-2 41.75, 91-4 166.75, 91-9 36.45) to pegmatitic (91-4 75.80, 166.75; 91-5 57.90) to coarse K-feldspar megacrystic (91-9 125.90; 91-10 123.85; 91-11 65,80, 116.10) and from leucocratic (91-6 14.60; 91-7 40.18) to mafic (91-4 42.60).

Syenomonzonite (91-3 35.10, 78.50; 91-4 132.50; 91-10 141.75) with K-feldspar to total feldspar (based on reconstruction of ?plagioclase altered to sericite, carbonate, epidote) about 65-75% and similar mafics to the syenites.