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Nakinilerak Property
93M/8E

Movement has occurred along many of the fractures, although the most common faulting directions are N 20°E and slightly east of north, as seen in the present open pit (Figs. 2 and 3).

The principal sulphide minerals within the ore zone are chalcopyrite, bornite and some pyrite. Medium- to coarse-grained chalcopyrite is the most widespread, occurring principally in quartz-filled fractures which vary from 1 to 5 mm in width. The mineralized fractures have preferred orientations of N 35° to 60°E and N 30° to 60°W, and dip steeply. The horizontal fracture set in the pit is only weakly mineralized. Chalcopyrite is also disseminated within the earlier quartz diorite phase and the inclusions of metasedimentary and metavolcanic rocks.

Bornite is most widespread in the southern half of the ore zone (Fig. 3), where it occurs with chalcopyrite and quartz in fractures. The greatest concentrations of bornite were confined to the upper 75 m of the south end of the orebody. A number of veins and breccia zones, of limited length and less than a meter wide, have been uncovered during mining operations. These contained coarse-grained, well-crystallized bornite, chalcopyrite, quartz, biotite and apatite.

Gold and silver are recovered from the copper concentrates. Molybdenite occurs locally within the ore zone, most commonly in drusy quartz veinlets which appear to be later than the main mineralizing stage.

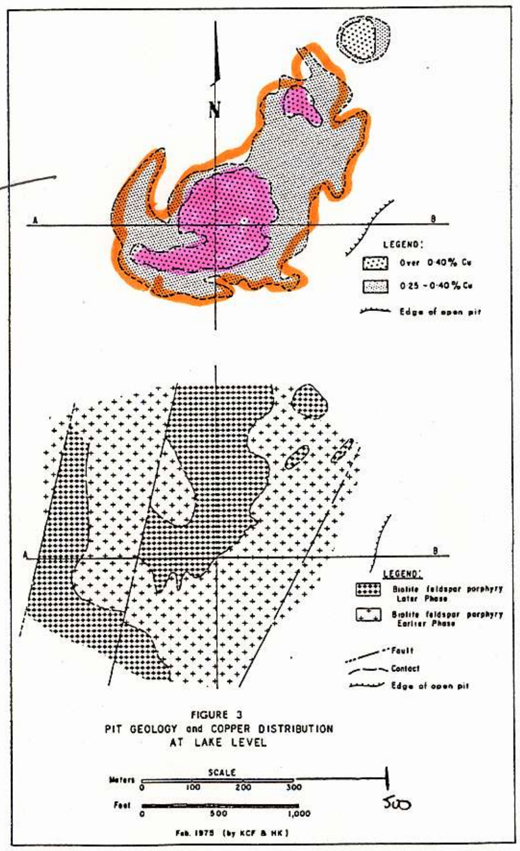

FIGURE 3 — Pit geology and copper distribution at Granisle.

GRANISLE

~ 80 MT @ .43% Cu.

Prod. reported 25 MT grading 3.26 mill gr. Au

Magnetite and specularite are common in the north half of the ore zone, where they occur in fractures with chalcopyrite and pyrite.

The greatest concentration of pyrite is peripheral to the copper orebody, where it occurs as blebs, fracture coatings, stringers and disseminations,

Near the southwest end of the island, approximately 1,200 m southwest of the pit, a narrow quartz-carbonate-pyrite-galena-sphalerite-chalcopyrite vein containing silver values follows a northeasterly striking fault for a limited distance.

ALTERATION

Alteration patterns at Granisle have been well documented by Carson and Jambor (1974).

A crudely oval zone of potassic (biotite) alteration is coincident with, but of greater areal extent than, the copper orebody (Fig. 1). Within this zone, intrusive rocks appear relatively fresh in hand specimen and plagioclase phenocrysts are essentially unaltered. The main alteration product is a dark brown secondary biotite, which occurs as very fine-grained aggregates entirely replacing original hornblende in all but the latest intrusive phase. Hydrothermal biotite has been shown by Carson and Jambor (1974) to have a lower TiO_2 content than primary biotite phenocrysts. Fine-grained biotite is also uniformly distributed in the matrix of the intrusive rocks. Near the outer limits of the potassic zone, hydrothermal biotite is commonly replaced by chlorite (Carson and Jambor, 1974).

Hydrothermal potassium feldspar is also present within the ore zone, but is of limited extent and detectable only by staining. It occurs mainly as fine grains in the matrix of the porphyry and as thin envelopes enclosing veinlets and fractures.

The potassic or biotite alteration zone is gradational outward to a phyllic or quartz-sericite-carbonate-pyrite zone in which sericite (muscovite), carbonate and minor quartz form an inner, partial ring around the deposit (Carson and Jambor, 1974), with a pyrite halo extending 150 to 250 m outward from the ore zone (Fig. 1). It appears to merge with a similar alteration along the regional fault southwest of the pit. Within the phyllic zone, intrusive and volcanic rocks weather to a uniform buff colour, with mafic minerals altered to a mixture of sericite and carbonate and plagioclase clouded by sericite. Pyrite occurs both as disseminations and as fracture fillings.

Outside the pyrite halo, most of the rocks on McDonald Island display varying degrees of propylitic alteration; chlorite, carbonate and epidote are common constituents in the matrix of the volcanic rocks and carbonate-filled fractures are widespread.

AGE OF MINERALIZATION

K-Ar age determinations on four biotite samples collected in and near the Granisle orebody yielded a mean age of 51.2 ± 2 million years (Christopher and Carter, this volume). The biotites analyzed were from the following samples: (1) a medium grey, well-mineralized biotite-feldspar porphyry from the south-central part of the orebody; (2) a quartz-chalcopyrite-bornite-apatite vein, also from the southern end of the orebody; (3) an unmineralized dyke of biotite-feldspar porphyry 900 meters southwest of the orebody; and (4) a dyke of dark grey biotite-feldspar porphyry of nearly post-mineral age, collected from the east side of the pit.