

OVERSEAS TRAVEL REPORT STUDY LEAVE IN CANADA

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LOWER HUTT

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

For papers copies - Island Copper

H-W argillites were originally basinal muds. Structural reconstruction shows some original troughs and bounding syndepositional faults.

Some good gold values but inconsistent and unpredictable. Gold deposition probably late, after the normal kuroko style zoned mineralisation. Best values in some peripheral pyrite zones. Gold is very fine and most is lost to the tailings.

Tennantite (Ag carrier) and bornite also occur in the deposit.

Environment: Bargh (1987, Myra Falls mine section, p 8-11) described the mine setting, environmental problems and tailings disposal methods.

Tour guides: Stephen Juras and Finley Baker

Tour: Lecture followed by view of drillcore, then long underground tour of 21 level. Brief tour of mill.

Samples:

P50376 large specimen of banded massive sulphide ore donated by Finley Baker

P50377 polymetallic ore

P50378 massive sulphide ore (pyrite and chalcopyrite)

Island Copper (11 March 1989)

Deposit type: porphyry copper.

Status: working open pit mine.

Location: Rupert Inlet, 18 km from Port Hardy, Vancouver Island.

Owner: Utah Mines Limited (BHP)

Production: commenced in 1971 and currently 50,000 tonnes of ore per day. Cu and Mo concentrates produced and shipped to Japan. 0.2 g/t Au in head grade. Gold separated from Mo concentrate. Mine reserves will be exhausted by 1995.

Regional Geology: Quartz feldspar (dacite) porphyry of the Island Intrusives (Jurassic) intrudes the Vancouver Island Sequence, consisting upwards of: Karmuntsen Formation (pillow basalts, breccias, flows, and some tuffs), Quatseno Limestone (some

interbedding with Karmuntsen Fm, hosts some skarn mineralisation), Parson Bay Formation (limy shales and tuffs, gradational contact with Quatseno Limestone), and Bonanza Formation (andesitic to basaltic volcanics, mainly pyroclastics with some flows).

Pit Geology: a dike of dacite porphyry, dipping 50 degrees to the north-northeast, intrudes the Bonanza Formation andesitic tuffs. Multiple phases of intrusion occurred; several pre-, one syn-, and at least one Post-mineralisation. The margins and part of the interior of the dike are complexly brecciated. Several types of breccias are recognised as follows: marginal breccias with (rotational breccia) and without (crackle breccia) mixing and/or rotation of fragments, a capping breccia (pyrophyllite breccia) and a late stage fracturing and veining breccia (Yellow Dog Breccia).

Hydrothermal Alteration: complex and atypical for porphyry copper deposit. Old theory: Chlorite + sericite + quartz vein envelopes (producing pervasive alteration when high density of veining) superimposed on a hornfels zonation of biotite, chlorite and epidote, progressing outwards. This overprinted with argillic and advanced argillic (pyrophyllite) alteration. New theory: Early alteration stage of quartz + magnetite + amphibole followed by biotite, chlorite + magnetite, and epidote zones. The biotite zone correlates with the Cu-Mo ore shell. Sericite accompanies stockworking and brecciation, usually with chlorite, following biotite alteration. Argillic and advanced argillic overprint.

Features: Presence of dumortierite (hydrous aluminium-boron silicate) and gillsonite (pyrobitumen - cooked hydrocarbons) in argillic and advanced argillic alteration.

Mineralisation: The Cu-Mo ore zone has the shape of an inverted "U" draped over the quartz feldspar porphyry dike. The ore shell has Cu and Mo rich zones. There is a good correlation of Au with Cu, but poor relationship with Mo. The ore minerals are chalcopyrite and molybdenite occurring primarily as fracture fillings and smears on fractures and slips, respectively. Over 40% of the ore is in the crackle zone and rotational breccias with the remainder primarily in the hanging wall and footwall volcanic rocks.

The main mineralisation is associated with biotite alteration and a secondary phase with quartz + sericite alteration associated with stockworks and breccias. Five phases of Cu mineralisation and four of Mo. Some high Hg in confined areas and a few Pb rich pockets. Some chalcopyrite veins outside of ore body and some Pb-Zn quartz veins peripheral to the deposit.

Tour guides: John Fleming and Gordon Clark.

Tour: 1.5 hour lecture, long tour of pit, and brief tour of mill.

Samples donated by Gordon Clark:

- P50367 unaltered quartz feldspar porphyry
- P50368 bedded andesite
- P50369 epidote altered andesite
- P50370 biotite altered andesite
- P50371 milled breccia
- P50372 stockwork quartz veins in altered quartz feldspar porphyry
- P50373 dumortierite from argillic alteration zone
- P50374 gilsonite (pyrobitumen) from the argillic alteration zone

Lawyers, Toodoggone

I was unable to visit the Lawyers epithermal gold-silver deposit in BC, however Peter Tegart of Cheni Gold Mines Inc. donated the two samples of breccia ore listed below. Lawyers commenced production in early 1989.

- P50365 hydrothermal breccia, high grade silver-gold ore, south end, ACB zone, 1700' level, Lawyers mine
- P50366 hydrothermal breccia, high grade silver-gold ore, north end, ACB zone, 1800' level, Lawyers mine

Sullivan

I was unable to visit the Sullivan sedimentary exhalative lead-zinc massive sulphide deposit in BC but the chief geologist, Paul Ransom of Cominco, donated the following samples:

- P50448 conglomerate or more properly pebble fragmental, footwall, central eastern footwall area