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EARLY MAGNETITE-RICH ALTERATION/MINERALIZATION IN THE ISLAND COPPER PORPHYRY COPPER-MOLYBDENUM-GOLD DEPOSIT, BRITISH COLUMBIA

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Island Copper, northern Vancouver Island, is a mid-Jurassic island-arc porphyry deposit within a WNW-trending zone of epizonal intrusion and magnetite (-Cu) mineralization. Early alteration was dominated by Fe ± Na metasomatism, producing a magnetite-rich (locally exceeding 10 vol. %), sulphide-poor zone, attaining widths of over 650 m and persisting along strike beyond the pit limits. Mass balance calculations reveal gains of up to 450% Fe and 42% Na. Three main alteration assemblages have been distinguished: 1) quartz-magnetite-albite (An_{3-6})±amphibole±apatite, occurring within the Main rhyodacitic porphyry dyke; 2) quartz-magnetite-amphibole-albite (An_{6-10}) or oligoclase-to-andesine (An_{27-36})±apatite±scapolite (trace), in basaltic Bonanza Volcanics adjacent to the dyke; grading outwards to 3) amphibole-magnetite±plagioclase (An_{23-36})±quartz±apatite. The amphiboles range in composition from magnesio-hornblende through actinolitic hornblende to actinolite, and display an overall outward enrichment in Si. Subsequent biotite-rich potassic alteration, accompanied by Cu(-Mo,Au) mineralization, is of lesser extent than, and occurs within, the essentially barren magnetite halo, and is best developed peripherally to the quartz-magnetite -rich core.

The Fe(-Na) metasomatism at Island Copper is clearly analogous to that which generated the andesite-hosted Chilean contact metasomatic iron deposits in which, however, superimposed potassic and phyllic alteration and sulphide deposition were extremely weak. Whereas it is possible that most porphyry copper systems experience an early magnetite-rich alteration/mineralization event, evidence of which is largely obliterated by later potassic and/or phyllic alteration, we favour the hypothesis that significant iron oxide enrichment was inherently more intense in specific deposits.

Program with Abstracts

GAC/MAC Vancouver '90

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