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THE ISLAND COPPER MINE

PORT HARDY, B.C.

by

John Lamb  
UTAH MINES LIMITED

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INTRODUCTION

Island Copper is controlled by Utah Mines Limited, a Canadian subsidiary of Utah International Inc., of San Francisco. Since 1976, the latter has been a wholly owned subsidiary of General Electric Company. The mine is 500 km. by the Island Highway, northwest of Victoria, and close to the town of Port Hardy. The pit lies on the north shore of Rupert Inlet, a branch of Quatsino Sound.

HISTORICAL SUMMARY

Utah's mining presence in B.C., dates back to 1951 when the Argonaut Iron Mine, near Campbell River commenced production. Operations there ceased about six years later. The company established an exploration division in Vancouver, in 1956, responsible for B.C., Yukon and Alaska. During those early years, this group actually worked on the North Island.

The release, in 1963, of a government airborne magnetometer map of the North Island, prompted Gordon Milbourne, a well known prospector, to locate his first claims near Frances Lake, about 1.5 km. west of the present pit. He, like everyone else on the Coast at that time, was looking for iron ore. Although no iron ore was discovered, he began to find traces of copper, which he followed up for the next 2½ years. At the same time he increased his holdings to 112 claims, a courageous move. In 1966,

Milbourne, and Utah signed an option agreement for exploration of these claims. X-ray diamond drilling commenced almost immediately, around his original showings and at the same time wide ranging geochemical soil sampling, geological and geophysical work were carried out. Several geochemical copper anomalies were found, of which one lay above the present orebody, then in thick forest, with no outcrop to indicate its presence. Early in 1967, after rather disappointing drill results on the original Milbourne showings, the Company moved a machine over to this latter anomaly, drilling hole No. 82, which penetrated the orebody. More drills were brought in and all work was concentrated here. By 1969, after 128 holes, the ore was essentially delineated and a feasibility report was issued, stating that there was almost 300 million tons of open pit ore, grading about 0.50% Cu. and 0.017% Mo. Soon after, clearing of timber and plant construction commenced. By late 1971, regular production started. In the ensuing ten years to the present time, over 128 million tons of ore and 383 million tons of waste have been removed from the pit, the bottom of which is more than 130 meters below sea level. Present daily production is 120,000 tons of waste rock and 40,000 tons of ore, yielding 750 tons of chalcopryite concentrate, grading 23% Cu. 0.2 oz. Au. and 1.25 oz. Ag. In addition, about 10 tons of 40% molybdenum concentrate are produced, containing 1100 p.p.m. of rhenium. The copper concentrate is shipped directly to Japan from a dock at the plant and the molybdenum travels by a combination of transportation methods to buyers in the U.S. and Germany.

From the signing of the option agreement, it was less than six years to production. It is a story of tenacity and considerable skill, performed in a remarkably short time, under difficult conditions.

Among those who played prominent parts in the exploration are Ed Rugg, Art Humphrey, Moe Young, Gerry Noel, Charley Aird and Brad Pearson, not forgetting Utah's exploration chief at that time, Holly Peacock. I'm sure that you will know, or know of, some of these men.

GEOLOGICAL SETTING

Upper Triassic and lower Jurassic rocks of the Vancouver Group form the backbone of Vancouver Island. The sub-groups of these rocks are the Karmusten basaltic flows, pillow lavas, breccias and minor sediments, overlain by Quatsino limestone, overlain in turn by Parson Bay limey argillite and chert, above which lies the Bonanza flows and pyroclastic rock, less basic and more varied than those of the Karmusten.

The great Dawson (Holberg ?) Fault, trending east-west passes about 1.5 km. south of the pit, with a downward displacement in this area, of possibly 2000 meters on the north side. Its lateral displacement is not known but suggestions have been made that it could be 80 km.

The orebody is in Bonanza rocks, possibly 500 meters above the base. The rock in the pit consists of coarse to fine, andesitic and dacitic volcanic breccias, lapilli, lithic and thin bedded tuff, chert and on one occasion a narrow bed of black argillite. Marine shell fossils have been located in the pit north wall and are causing some controversy among palaeontologists.

Observations on the thin bedded rocks, suggest there is an anticlinal type structure in the north wall, plunging steeply SSW toward the mid section of the ore body.

In plan the ore body has the shape of an attenuated ellipse, sub-parallel to the WNW formational trend and to a narrow irregular dike of quartz-feldspar porphyry, dipping northward from 45 to 60 degrees, almost at right angles to the regional dip of the Vancouver Group rocks. In cross section the ore body has the form of an inverted 'U', draped around both sides of the dike.

The ore zone is strongly fractured, with sulphides forming hair-like veinlets on the fractures. Approximately 75% of the ore is in the volcanic wall rock, the remainder being in porphyry and associated breccias. In fact most porphyry alone, is almost barren of copper and molybdenum.

Breccias

A large cap of pyrophyllite breccia, up to 150 meters wide, overlies the dike at the western end of the deposit, having a minimum length of 850 meters. It contains angular fragments of both porphyry and volcanic wall rock, scattered throughout a matrix of massive grayish-tan pyrophyllite. Rare blue dumortierite is common in this breccia.

Marginal breccias are found on the contacts of the dike, having a crackled appearance, suggesting little movement of fragments.

The Yellow Dog breccia, named from the color of its ferroan dolomite veins is most pronounced on the northern flank of the porphyry system, near the mid point of the ore body, tapering both to the east and west. Several narrow streaks of this breccia penetrate the wall rocks for long distances to the north and south. The breccia is composed of volcanic and porphyry fragments, healed and laced with quartz and carbonate veins. Its color is becoming darker with depth, due to the increasing quantity of magnetite.

Faults

There are innumerable minor slips and faults of small displacement but the only major structure is the steep End Creek Fault, situated southwest of the ore body, forming an acute angle with the regional trend. It may well be a splay, off the Dawson Fault. We speculate that fault movement both pre-dates and post-dates the period of ore formation.

Alteration

Contact metamorphic alteration permeates large volumes of rock, forming a 100 meter wide biotite zone, a 180 meter wide transition zone and a 350 meter wide epidote zone, in that order, outward from the porphyry dike.

Wall rock alteration characterizes much smaller rock volumes and comprises chlorite-sericite, sericite, pyrophyllite and yellow dog, which are closely related to fracturing and brecciation.

Environmental Consideration

I am sure you are aware that Island Copper is a test case for the on-going controversy over the sub-marine disposal of mine tailings and has been studied by a number of groups and visited from around the world by those who would know more about the subject. Following is what our chief of environmental control, Mr. Ron Hillis, has to say about it. I quote:

"Environmental monitoring (over the past eleven years) of the receiving waters and the biota within, indicates that there has been a change in the nature of the sea-floor habitat but that this change has not caused any significant adverse impact on the environment".

Speculation

Vancouver Island is a copper "province". This fact is borne out by at least ten past and present producing mines, most of them rather modest in size. I include here the Texada and Quadra deposits, because their rocks belong to those of the Island rather than to those on the mainland. I have read of numerous other copper showings and personally seen at least six, which will probably never get beyond the prospect stage. And one must not forget the large Catface porphyry deposit near Tofino, which has yet to be put into production.

Why is the Island a copper "province" ? Apart from deposits associated with Permian Sicker group rocks and Tertiary rocks near the south end, most of the deposits are associated with Vancouver Group rocks. I am suggesting for your consideration that the Karmutsen Group is the source of this copper, whether it still resides there or elsewhere. These rocks are known to contain above background amounts of copper over thick sections. This fact suggests to me large volumes of lightly mineralized rock, from which copper might well be re-mobilized and concentrated in favourable traps.

The most numerous types of deposits are the high grade skarn replacements near limestone-volcanic-intrusive contacts, like the Coast Copper or the Indian Chief mines. Probably more important because of their size are the low grade porphyries like Island Copper and Catface. Keeping in mind that the sedimentary Parson Bay and Quatsino formations, probably intersect the root of the Island Copper deposit at depths of 600 to 900 meters, leads us to speculate that there may be mineable skarn type bodies well below the present pit.

On a final note, it is interesting to speculate why the Island is so different than the mainland. Certain government and university geologists both in Canada and the U.S., from their paleomagnetic studies, are proposing the concept of a land mass they call Wrangellia, although I understand Jan Muller prefers the name Insular Belt. At any rate, the theory goes, that the rocks of Vancouver and Queen Charlotte Islands and certain areas of the Alaska panhandle are part of one small land mass, now welded on to the North American plate, although they were formed at latitudes of 15 degrees north or south of the Equator.

Did this land slide up the coast of the Americas' or did it drift in from the mid Pacific Ocean? Maybe this is one reason why Island Copper is unique among the porphyry deposits in B.C.

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