

THE WESFROB MINE

103 F/78

(Latitude 52° 45.8' N., Longitude 132° 0.26' W., Elevation 150 feet)

802905

LOCATION, ACCESS AND CLIMATE

The Wesfrom Mine is found nestled on a mountainside along Tasu Sound in the Queen Charlotte Islands. This scenic but rugged mountain setting is located about 500 miles northwest of Vancouver, British Columbia.- Figure 1 - "Location Map", depicts the location of Tasu with respect to the west coast of British Columbia. The town of Tasu, located on adjacent Gowing Island, is connected to the mine site by an earthfill causeway.

Passenger access to Tasu is almost exclusively restricted to air travel. There are daily Boeing 737 jet flights direct from Vancouver to Sandspit, and connecting air service to Tasu aboard amphibious aircraft (DeHavilland Beaver and Grumman Goose). During periods of bad weather when air transportation between Tasu and Sandspit is impossible, surface transportation may be employed utilizing boats and land travel over logging roads. Heavy equipment and supplies are barged in from Vancouver on a regular basis every six weeks. The trip takes upwards of 56 hours depending upon the weather.

The climate in Tasu is heavily influenced by the surrounding mountains and nearby Pacific Ocean. The yearly mean temperature is 46.2° F with January being the coldest month at 30.8° F mean minimum, and August the warmest month with a 63.3° F mean high temperature. Very high winds and driving rain are characteristic of winter storms. Total yearly precipitation averages 158 inches per year, characterized by periods of heavy rainfall. In October of 1973 a new record rainfall of 8.38 inches was set for a 24 hours period. The average yearly snowfall amounts to 38 inches at lower elevations.

HISTORY AND OWNERSHIP

The Tasu magnetite-chalcopyrite deposits were first located and explored around 1907 to 1909, and were commercially exploited for copper during the war years 1914 to 1917. During this time, two adits, one stope and an exploratory winze were driven. The stope yielded 5,180 tons of ore grading 1.60 percent copper. In addition, a camp was established and a tram-line erected to tidewater 950 feet below.

The first claims were acquired by Frobisher Ltd. in 1953 at a time when there was no apparent market for the iron ore and the copper content was a relatively unknown factor.

For many years, there had been a political effort in British Columbia to establish an iron and steel industry within the Province. To aid in achieving this objective, legislation was passed in 1951 to prevent the export of iron ore from all but a few properties to which the owners had special title. By the mid-fifties, this legislation had become unpopular and there were moves afoot to have it rescinded. Moreover, a possible buyer for B.C.'s lump magnetite ore appeared, in the form of the Japanese steel companies.

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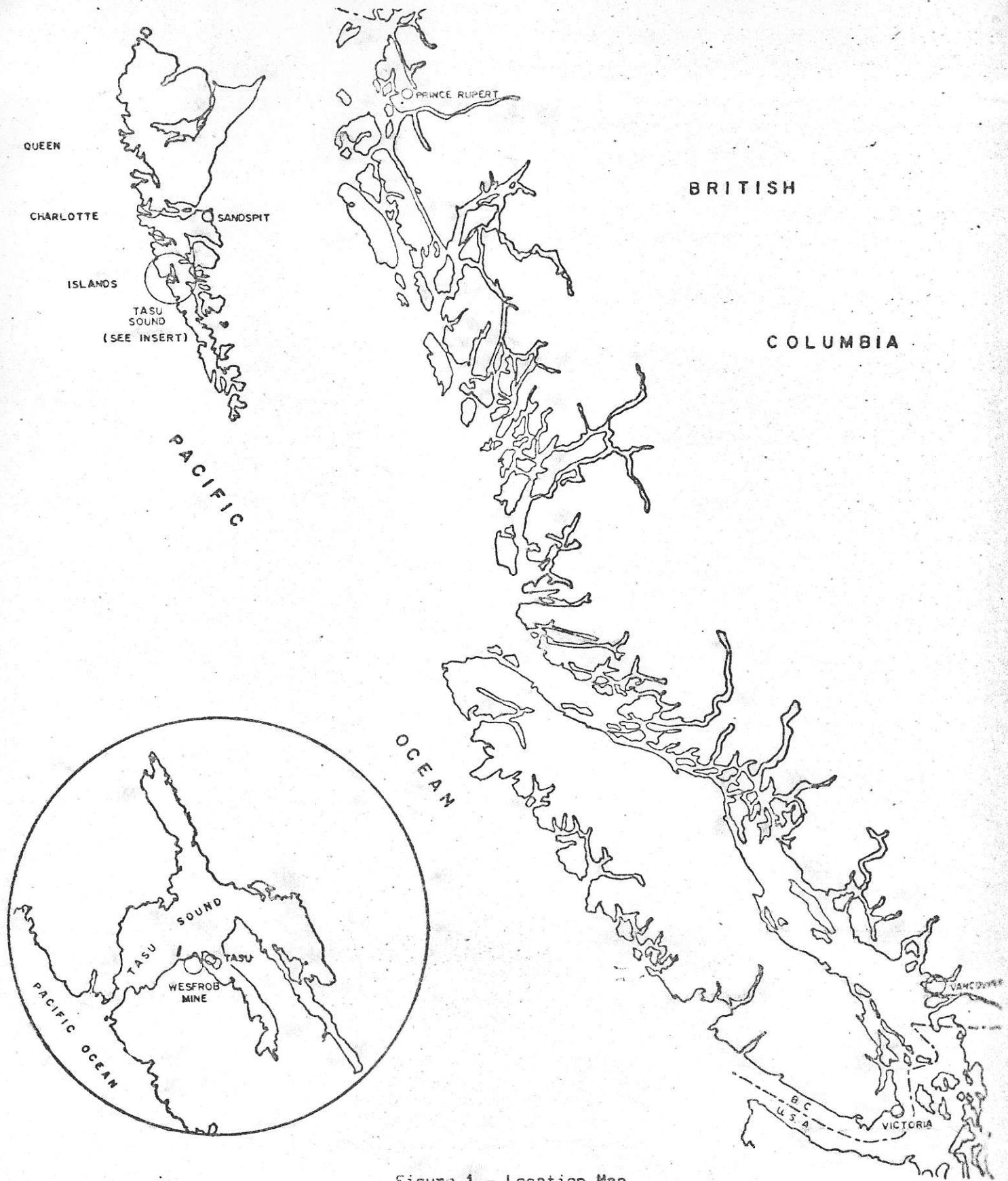


Figure 1 - Location Map

In February 21, 1956, Wesfrob Mines Limited was incorporated in the Province of Ontario as a wholly-owned subsidiary of Falconbridge Nickel Mines Limited. To prepare for the apparently improving political and market climates, Wesfrob embarked upon a small scale of exploration in 1956 in order to discover the order of magnitude of the mineral occurrence at Tasu and its metallurgical characteristics.

In the meantime, the provincial government had been active in the legislative field and new regulations were coming into effect. As anticipated, the restrictions on the export of iron ore were removed, but in their stead the government declared that title to one-half the reserves found by an iron mining company should be retained by the Provincial Crown, presumably for the purpose of supplying some future iron industry with ore. Furthermore, it was proposed that a tax would be levied not upon the ore or concentrates produced by an operating mine but upon its ore reserves still in the ground. These laws immediately and very effectively brought a halt to all iron ore exploration in the Province. However, the two-year program of geological, metallurgical and market investigation brought to Wesfrob a general understanding of the Tasu ore occurrences, the products that could be obtained from these ores and the markets available to these products.

In October 1960, the provincial government removed its restrictive Crown claim to ore reserves and the taxation of iron ore in the ground and permitted the production and export of ore in return for a fair and equitable royalty. At the same time, the Japanese steelmakers were turning to sinter feed for their blast furnaces and this opened an avenue for the use of Tasu's crushed and concentrated ore.

Exploration was resumed in 1961, and work at the property was continuous until the preparations for production began in mid-1964.

While the feasibility report was being prepared, and later while it was being studied, additional ore tonnages were being found at Tasu, metallurgical tests were providing alternative product specifications for the Japanese steel mills to consider and the Japanese ore buyers were broadening their search for competitive ore purchases. Shipping too was in a state of flux; whereas 20,000 ton ore carriers had been a standard size, carriers of 50,000 tons capacity were now being considered. Although these would reduce freight costs to the steel mills, they would mean considerably increased costs to the ore seller, who would have to install dock and ore-loading facilities of increased size and complexity.

By August of 1963, it was apparent that the increased tonnage potential to Tasu, the greater knowledge of the possible products that could be produced and the likely prices to be offered by Japanese steel companies justified a more detailed and precise study by the consulting design engineers. This time, they were asked to consider a production of one million annual tons of iron concentrate together with the resulting by-product tonnage of copper concentrate. However, from an almost complete reliance upon good-quality lump iron ore in 1957 the Japanese were now, in 1963-64, seeking crushed iron concentrates of the highest quality. Whereas Wesfrob had previously been asked to produce the coarsest possible concentrate, they were now being asked to produce a particle size less than 325 mesh.

Falconbridge metallurgists were equal to the task, however and two grades of concentrate were offered and eventually accepted - one which could be used as a sinter feed and one to be used in making iron pellets.

On July 1, 1964, Wesfrob closed its exploration account at a cost of one-half million dollars and commenced preparation for production. Shortly thereafter, the hectic period of construction began and progressed with numerous problems and frustrations through to production and later shipment of iron concentrate to Japan in August of 1967.

### GEOLOGY

Tasu is one in a series of contact metasomatic deposits occurring along the coast of British Columbia.

The country rocks involved are Upper Triassic. A thick series of andesitic and basaltic lava flows known as the Karmutsen is overlain conformably by the Kunga limestone formation. The basal member is a massive white or light grey recrystallized limestone, in places 600 feet thick, in turn overlain by a black flaggy limestone and argillite.

Small stocks of batholiths, typical to the Coast Range intrusions, cut these Upper Triassic rocks. The Tasu deposits are located close to the San Cristoval batholith of foliated hornblende diorite, and are found at or near the contact of the limestone with the volcanic rocks. Structurally, the orebodies are further localized by second-order folds, re-entrants and faults in the basement contact.

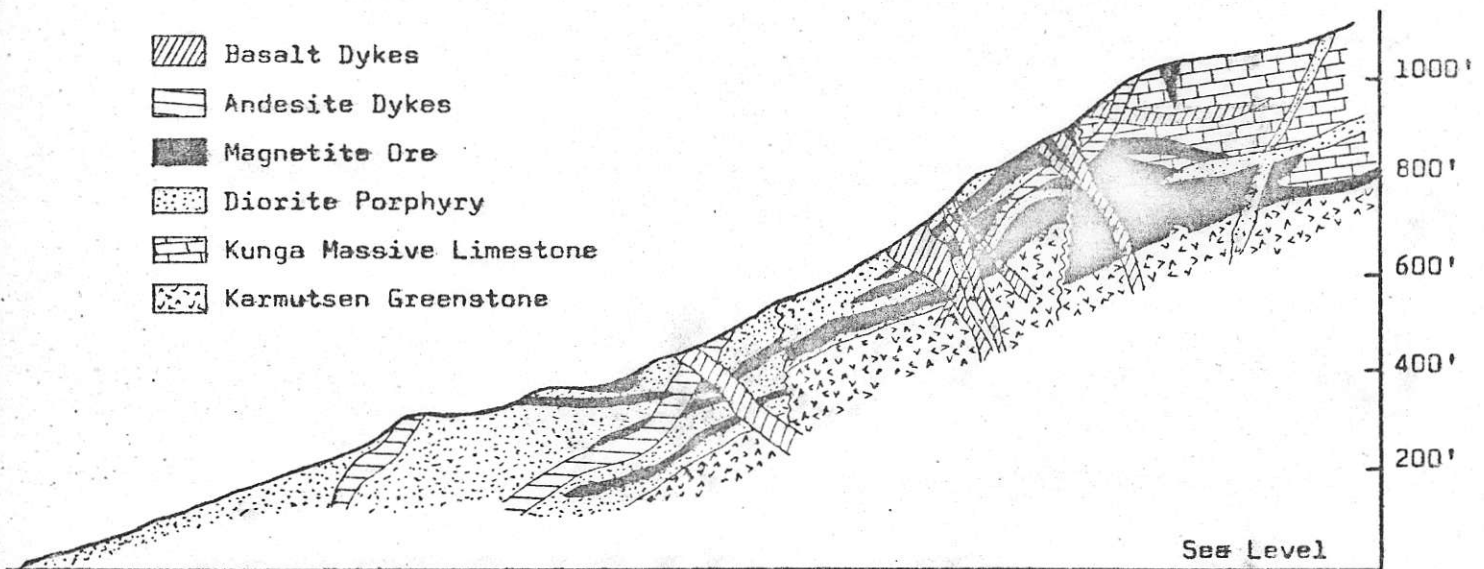


Figure 2 - Typical Geological Section Through The Tasu Orebody

The deposit is associated with skarn, usually made up of garnet-pyroxene-epodite, although amphibole and chlorite may replace pyroxene. Skarn development appears to be primary, with both magnetite and skarn replacing limestone, limey tuffs and early intrusive rocks, the latter being feldspar porphyry and andesites.

The most reasonable source of the deposits is the distillation of iron from the iron-rich Karmutsen series by the heat of the advancing diorite batholith and its associated feldspar porphyry intrusions. The area around the deposits is heavily cut by numerous post-ore basaltic and andesitic dykes.

Zone 1 is a replacement of feldspar porphyries that have been intruded along the limestone contact in the form of a highly complex 'Christmas Tree' laccolith. This orebody is very irregular, with essentially dendritic stringers connecting large lenses of copper-free magnetite.

Zone 3 is more massive, with one large sausage-like orebody lying along the limestone-volcanic contact. This Zone differs from Zone 1 in that it is a replacement of limestone instead of feldspar porphyry. It is also more uniform in its configuration and contains approximately 0.75 percent as finely divided chalcopyrite.

Zone 2 is actually a transition in setting from that of Zone 1 on the north to Zone 3 on the south, with limestone replacement to the south and feldspar porphyry replacement to the north; portions of the orebody contain chalcopyrite mineralization.

The post-ore basaltic and andesitic dykes present a situation in which the orebodies are criss-crossed with ribbons of waste up to 40 feet in thickness. Figure 2 illustrates a typical geological section of the Tasu orebody.

#### PROPERTY OPERATION

The Tasu property is under the direction of a resident Mine Manager who is assisted by the Production Superintendent. The Mining, Milling and Maintenance Departments are each headed by their respective Superintendents, and Accounting, Engineering and Warehousing are under the guidance of their own Department Head.

Wesfrob Mines Limited is supplied with such services as purchasing, accounting, barge loading and mining exploration from a Vancouver office. This office acts as Tasu's liason with respect to data transmission and computer facilities. A direct Telex line is maintained between Tasu and the Vancouver office.

Since Tasu is an isolated community, it must maintain a townsite in addition to operating a mine. A dam and fish ladder were constructed on nearby Wright Lake and fresh water is transported 33,000 feet along rugged mountainous coastline through a 16 inch diameter pipeline. This water supplies domestic needs, the concentrator and the fire protection systems. The mine