

there is a fringe of amphibolite along the shore; and between Mike and Sunday Inlets is (0600 hours) a very white post-tectonic granite porphyry. The roof contact of the latter can be seen on the mountains at the head of Pocket Inlet and the coarse intrusion breccia of the western contact near Barry Inlet. Black, early Tertiary basalt dykes become increasingly prominent northward.

Tasu Sound (0630 hours, August 10th) is entered through a spectacular portal. Once inside something can be seen to the south of a north-plunging complex syncline at the northern terminus of the San Christoval batholith. Here, overlying the basalts, are Late Triassic to Sinemurian flysch deposits composed of massive limestone overlain successively by flaggy black limestone and argillites. The Tasu iron-copper skarn orebody replaces basalt, limestone, and a flat Christmas-tree diorite porphyry laccolith on the eastern limb of the syncline.

VISIT TO TASU MINE OF WESFROB MINES, LTD.

0730 to 1630 hours

GEOLOGICAL NOTES

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Operation of the Tasu mine by Wesfrob Mines Limited began in 1967 when stated reserves of assured and indicated ore amounted to 43 million tons, about half mineable by open pit. From 2,120,646 tons mined and milled in 1969, 1,040,263 tons of iron concentrate and 40,122 tons of copper concentrate containing 16,917,900 pounds of copper were produced and shipped to Japan.

Tasu is at the northern extremity of the long, narrow San Christoval batholith. Its iron-copper pyrometasomatic ores occur in an embayment of older rocks surrounded on three sides and underlain at shallow depth by foliated quartz diorite of the batholith. The country rock includes amygdaloidal basalt of the Upper Triassic Karmutsen Formation, conformably overlying massive and thin-bedded limestone units of the Kunga Formation and diorite porphyry. The latter occurs as thick sills or laccoliths intruded along or near the Karmutsen-Kunga contact and also as numerous dykes in both formations. The rock is composed of abundant plagioclase and fewer hornblende phenocrysts set in a microcrystalline or aphanitic matrix. The genesis of this important host rock is uncertain. It may represent an early, hypabyssal phase of the San Christoval batholith emplaced before or during regional deformation.

The stratified rocks have the form of a broad synclorium and flanking anticline, with major fold axes plunging about 25° to the northwest. The mine area is traversed by many pre-ore faults of diverse orientation with apparent displacements ranging up to 200 feet (60 m).

The prime locus of rock alteration and ore deposition is the warped and faulted Karmutsen-Kunga contact. Skarn composed of actinolite, anthophyllite, tremolite and brown garnet in varying proportions and abundance occurs as stratiform sheets and lenses commonly elongated along the north-westerly plunge of fold axes. Basalt and diorite porphyry were altered in preference to limestone probably because of the superior permeability of these rocks afforded by their profusion of minor fractures and cataclastic texture. Faults and fractures are secondary loci of replacement by both silicate and ore minerals. Skarn alteration gives place peripherally to propylitic alteration expressed by the appearance of epidote, chlorite, disseminated pyrite and sericite.

Ore bodies occur within the general stratiform skarn zones as irregular sheets or mantos with local thickenings and vein-like protrusions along faults and porphyry dykes. Most ore bodies are encased in skarn but some are in abrupt contact with recrystallized limestone. The ore is almost massive magnetite with small amounts of pyrite, pyrrhotite, chalcopyrite and rare sphalerite. A paragenetic sequence is evident. Magnetite replaces skarn or less commonly limestone and in places cements brecciated skarn. Sulphides occur interstitially or occupy fractures in magnetite.

The ore zone is transected by post-ore dykes of porphyritic andesite and basalt which in some pits are so numerous that they raise dilution problems.

END

Leaving the mine at 1630 hours and north from Tasu Sound the Triassic basalts can be seen cut by a myriad of dykes and from Portland Bay to Kootenay Inlet early Tertiary volcanic rocks, mainly laminated ash flows, along the shore and peaks. From Kootenay Inlet to Skidegate Channel (1700 hours) the Triassic basalts occur in a broad anticline striking seaward and complicated by faulted inliers. Limestone of the overlying flysch outcrops at the entrance to Kootenay Inlet at the south and Marble Island at the north. An inlier of Tertiary volcanic rocks occurs from Kootenay Inlet to Bottle Point.

On Graham Island, north of Skidegate Channel, Tertiary rhyolites outcrop as far as Gudal Bay and spectacular

columns occur at Ells Point. From Gudal Bay to Rennell Sound (1800 hours) a composite batholith outcrops; its western phase is syntectonic (143 m.y.); to the west it is cut by two post-tectonic phases (30-26 m.y.) that intrude the early Tertiary volcanic rocks. From the north shore of Rennell Sound to Beresford Bay, near the northern tip of the islands, early Tertiary intercalated columnar basalts and welded rhyolite ash flows occur. These are strikingly exposed along a fault scarp in Rennell Sound where they are tilted to the north at about 30°. Apart from a gentle anticline along the shore from Hippa Island (1900 hours) to Otard Bay (2000 hours) these rocks are nearly flat-lying and form a prominent plateau. From Beresford Bay to Pillar Bay, east of Langara Island, the geology is very complicated for it not only includes all the units mentioned but also thick Cretaceous sandstones and conglomerates, many plutons and large volcanic dykes. The low coastline of the north shore is underlain from Pillar Bay to Maset Sound by early Tertiary basalts, and from there to Rose Spit by Miocene and Pliocene sands and shales. These are intruded by an olivine basalt sill that form the one prominence, Tow Hill.

During the night the ship will cross Dixon Entrance and follow Portland Inlet and Observatory Inlet to Alice Arm. In the early morning the ship will be docked across the bay from the new mining town of Kitsault and the B.C. Molybdenum mine.

VISIT TO B.C. MOLYBDENUM MINE

0700 to 1630 hours, August 11th. As the dock of Kitsault is too shallow to accommodate the ship, passengers will be ferried across the bay. The old mining town of Alice Arm, which serviced former silver mines in the area, is about one mile (1.6 km) along the road from the dock.

GEOLOGICAL NOTES

J. A. Gower

A stockwork molybdenum deposit on Lime Creek, 5 miles (8 km) southeast of Alice Arm is owned by Kennecott Copper Corporation and is in production at a rate of 12,000 tons per day. It is one of several deposits associated with stocks adjacent to the Coast crystalline batholithic complex whose eastern boundary lies a few miles west of the mine. It is possible that these stocks are not satellitic to the Coast complex; they may represent a separate geologic event (Ney,