have been found. These strike northeast and dip southeast, strike east-northeast and dip southeast, and strike west-northwest and are nearly vertical. Joints are variously filled or coated by quartz, epidote, aplite, pyrite, and copper sulphides.

Chalcopyrite and bornite are the ore minerals at Bethlehem Copper. Molybdenite, specularite, and rarely chalcocite and tetrahedrite also occur. Chalcopyrite is the main ore mineral. It occurs with pyrite in the central parts of quartz veins, as disseminated grains replacing chlorite and epidote adjacent to fractures, in fault gouge zones where it is often broken by post-mineralization movement, and as coatings on joint surfaces in association with bornite, pyrite, chlorite, epidote, zeolites, and chlorite. Bornite has similar modes of occurrence. Molybdenite is most abundant in breccia zones and is often seen on slickensided faults. It is associated with chalcopyrite, tourmaline, and secondary biotite.

Alteration and ore grade are apparently directly related to faults and fracture intensity. Studies of the Jersey orebody indicate that it has a central core characterized by a chlorite, sericite, clay mineral assemblages with a fringing zone characterized by epidote. Pyrite also forms an ill-defined halo around the Jersey orebody.

Oxidation Zone

Only the Iona deposit has an appreciable oxidation zone. Even at the surface primary minerals can be found but oxides persist to depth of 40 metres. Malachite, azurite, chrysocolla, goethite, jarosite, manganese oxide, ferrimolybdite, cuprite, native copper, chalcocite, powellite, and erythrite have been identified. No appreciable supergene enrichment occurred.

HIGHMONT

OWNERSHIP: Highmont Mining Corp. Ltd. (controlled by Teck Corporation).

The Highmont property is underlain chiefly by Bethlehem quartz diorite (*see* Fig. 20). The contact with the Bethsaida quartz monzonite crosses the westernmost part and a 120-metre wide composite dyke extends 3 km eastward from this contact across the property. The deposits consist of five large low-grade mineralized zones ranged on either side of the dyke. The zones have maximum dimensions of 360 to

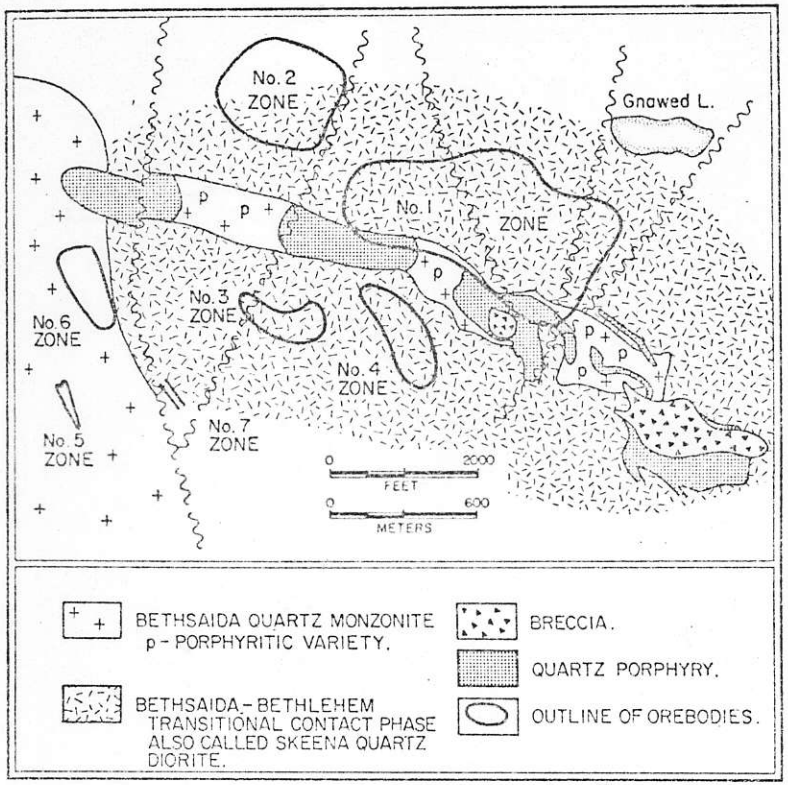

Fig. 20. Geology of Highmont.

1,100 metres and are oriented either west-northwest parallel with the dyke or north-northwest.

Dykes and Breccias

The main dyke is emplaced in closely fractured Bethlehem quartz diorite. It consists of porphyritic Bethsaida granodiorite which is cut by quartz porphyry bodies with irregular shape and local offshoots which extend as dykes into the quartz diorite. The main bodies of quartz porphyry have aplitic ground masses, indicating rapid crystallization. Breccia zones within the dyke are attributed to explosive escape of volatiles released during crystallization. Mineralization is post-breccia.

Structure

The fracture pattern for the deposits north of the dyke is illustrated by attitudes taken in the underground sampling adit. Two main fracture sets predominate, one striking southeast and dipping steeply northeast, the other striking northeast and dipping moderately northwest. The fractures are not evenly distributed but form local swarms of parallel fractures, and in these areas, ore grade is above average. South of the dyke ore controlling fractures probably dip toward the south.

Vein and Alteration Mineralogy

Principal ore minerals in the deposit are chalcopyrite, bornite, and molybdenite. Pyrite and specular hematite are the only other metallic minerals. The ore minerals occupy four types of veins or fracture fillings: (1) vuggy quartz-chalcopyrite-bornite-molybdenite veins 2 to 25 mm wide with tourmaline-sericite and potash feldspar envelopes, (2) massive quartz-chalcopyrite-pyrite-molybdenite veins up to 10 cm wide, (3) brecciated quartz-molybdenite-clay veins up to 1 metre wide, (4) sugary barren quartz veins. Ore minerals also occur as disseminations in altered country rock adjacent to fractures. Other vein minerals include calcite, siderite, epidote, zeolite, and gypsum. Locally chlorite and green sericite are pervasively developed.

Zoning

In the two mineralized zones which have been most clearly studied distinct mineral zoning has been found parallel with the dyke contact. Near the dyke chalcopyrite and bornite occur in roughly equal amounts; this zone grades outward to one with chalcopyrite, uncommon pyrite and rare bornite, and finally, to a pyritic zone in which pyrite locally amounts to 1 per cent of the rock. Molybdenite has no apparent systematic distribution pattern.

Oxidation of the ore is very limited except for local downward penetration along faults.

LORNEX

OWNERSHIP: Lornex Mining Corporation Ltd. (controlled by Rio Algom Mines Limited).

The Lornex deposit has an elliptical outline 500 by 1,300 metres with the long axis oriented northwesterly. It lies