

## Description of core samples from the Chapel Street borehole, Glenorchy

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The following are descriptions of rock specimens taken from the lower part of the core recovered from the Chapel Street, Glenorchy, diamond drill hole.

### **1940 feet (591 m)**

The hand specimen is a mottled, yellowish-green, sheared granular rock of density 2.92. It consists of a confused assortment of irregular crystals of feldspar, granular aggregates of epidote and dark masses of chlorite in a fine-grained schistose matrix. Opaque white carbonate is common and the rock as a whole effervesces with acid in minute bubbles.

Schistose structure is very prominent in thin section and the lines of schistosity in the matrix show mild micro-folding and crenulation. The matrix is so fine grained as to be semi-opaque but under high magnification is resolved into granular feldspar, partly sericitised and mixed with flakes of chlorite, and grains and aggregates of epidote.

The larger crystals of feldspar show lamellar, carlsbad and pericline twinning. They are cloudy with alteration and diagonally orientated so as to give lozenge shapes tailing off into brushes of sericite. Extinction angles perpendicular to albite lamellae average about 11° which taken with a refractive index very close to that of balsam indicates an albitic oligoclase. Some of the crystals have been sheared in pieces along diagonal planes and the pieces moved to give lenticular and distorted aggregates.

A pale yellowish-green epidote is very common as minute disseminated crystals and patches of mosaic 2–3 mm long.

Chlorite occurs in elongated masses of small plates and as minute flakes in the matrix. It shows anomalous Berlin blue interference colours and is therefore penninite.

Calcite is common and occurs in fine-grained distorted masses and as small patches of mosaic.

Sericite occurs as an alteration product of feldspar and is common in small flakes and masses showing distortion.

The rock is an albite-epidote-chlorite schist.

### **1957 feet (596.5 m)**

The hand specimen is a sheared greenish yellow rock with irregular patches of bright green chlorite up to 20 mm long. Carbonate is present in pale pink or purple veinlets. There is much quartz and the specific gravity is 2.81.

In thin section the rock is an intergrowth of minute books of sericite and penninite with veinlets and patches of carbonate and a little disseminated epidote. The chlorite is strongly pleochroic with the absorption scheme X deep green > Y green > Z yellowish. The birefringence is very low and the colours anomalous Berlin blues. The mineral is therefore penninite. It is intergrown with sericite, easily distinguishable by its lack of colour and higher birefringence. Carbonate occurs in veinlets and patches, often with very indefinite margins, and is brownish by transmitted light. Vein quartz is present. The rock is a chlorite-sericite schist.

### **1965 feet (598.9 m)**

The hand specimen (specific gravity 2.90) is a greenish rock with colourless crystals of feldspar, rounded aggregates of yellowish-green epidote and books of dark green chlorite, all about 1–2 mm long in a fine-grained matrix. Effervescence with acid indicates the presence of calcite and there are rare crystals and aggregates of pyrite. Alignment of the larger grains, which are very plentiful, emphasises that the rock has been strongly sheared.

In thin section the rock has a schistose structure due to the shape and orientation of the larger grains and crystals and to the texture of the matrix which is semi-opaque white, due to the difference in refractive index of the epidote and feldspar of which it is largely composed.

The larger grains are elongated subrounded masses consisting largely of fine-grained structurless sericite with a few traces of original feldspar. A few grains contain unaltered feldspar with extinction angles of about 14° normal to the lamellar twin plane and refractive indices about the same as that of balsam and which is therefore albite.

Deformed and twisted books of penninite are common and there is much moderately fine-grained feldspar and calcite, and epidote mosaic.

The rock is an albite-epidote-chlorite schist.

### **1966B**

The hand specimen is a sheared, medium-grained pale greenish rock consisting of orientated feldspar crystals 2 or 3 mm long with occasional rounded masses of yellowish-green epidote in a dark green matrix. Specific gravity is 2.86.

In thin section the texture is porphyroclastic consisting of slightly worn and rounded crystals of sodic oligoclase with occasional fractures and veins of calcite, in a very fine-grained semi-opaque matrix of feldspar, epidote, chlorite, calcite, etc. The feldspars show complex twinning and some alteration, with numerous inclusions of epidote, etc. There are also occasional grains of similar size and shape but consisting of epidote and chlorite with minor calcite and feldspar.

The rock is an albite-epidote-chlorite schist.

### **1966A**

In hand specimen this is very similar to 1966B but the larger feldspar crystals are less prominent and there is more epidote. The specific gravity is 2.94.

In thin section the rock appears at first to be an almost structureless mixture of fine crystals of epidote, feldspar, chlorite and calcite and the porphyroclastic texture is with some difficulty perceived, the larger crystals of feldspar being obscured by the masses of epidote grains. Penninite is also very plentiful together with calcite and very fine-grained opaque white material.

The rock is similar to 1966B but the similarity is obscured by the widespread development of epidote.

The rock is an albite-epidote-chlorite schist.

### **1971 feet (600.7 m)**

The hand specimen is a strongly sheared, yellowish-green, granular rock, consisting of irregular feldspar crystals up to about 3 mm long, granules and flattened masses mainly of epidote up to 20 mm long and patches of chlorite and calcite.

In thin section shearing is apparent in the alignment and fracturing of twinned oligoclase crystals and the flow texture of the semi-opaque, very fine-grained interstitial material. Brownish epidote occurs in granular and sub-radiating crystalline masses, sometimes with selvages and chlorite in platy masses associated with carbonate and epidote.

The rock is an oligoclase-epidote-chlorite schist.

### **Summary**

In general the specimens consist of low grade metamorphic rocks belonging to the greenschist facies and consisting essentially of chlorite, epidote and albite, or their products. The parent rocks would appear to have been tuff and crystal tuff associated with spilitic lavas. The metamorphism was of epizone type, producing cataclastic and dynamothermal textures. The suite shows strong affinities with rocks of the Dundas Group and Mount Read Volcanics as exposed in the Rosebery area, at Beaconsfield, in the Lake River district and elsewhere.

The age suggested is therefore Lower Cambrian.

[27 September 1971]

## APPENDIX 1

### Further core descriptions from the Chapel Street borehole

The following descriptions of core from the diamond-drill hole at Chapel Street, Glenorchy, are to be added to the descriptions of 27 September. These descriptions carry the examination of the core down to the bottom of the hole and may indicate a change in rock type and provenance from chlorite-epidote schist derived from basic tuffs to sericite schist of purely sedimentary origin. The rocks herein described seem to be intermediate between the two, and as well as sericite and a little quartz also contain albite, epidote and chlorite with a tendency of one or the other assemblage to predominate over a small area of thin section.

The more sericitic rocks have a somewhat lower density, but barely significantly so.

#### **2014 feet (613.8 m)**

The hand specimen is a grey schistose rock of specific gravity 2.80, and similar to the rock at 2000 feet (610 m). It contains porphyroblasts of feldspar and epidote about 1 mm across and veinlets of calcite.

In thin section the fine-grained banded groundmass is dominantly feldspathic with granular epidote and a little sericite and chlorite. Calcite occurs in bands consisting of a mosaic of angular grains.

Albite occurs as lenticular porphyroblasts altered partially to sericite and associated with penninite. Patches of fine-grained quartz-albite mosaic occur.

The rock is an albite-sericite schist with chlorite and epidote.

#### **2000 feet (610 m)**

The hand specimen is a grey schistose rock with a silken lustre on the cleavage faces. It is dense and fine grained with a specific gravity of 2.87. Rounded and lenticular porphyroblasts up to 5 mm across are fairly common. The rock effervesces with acid.

In thin section the rock is a finely banded fine grained mass of sericite, chlorite, feldspar and a little quartz.

The porphyroblasts consist largely of epidote and calcite with some penninite.

The rock is a chlorite sericite schist.

#### **2002 feet (610 m)**

The hand specimen is a grey fine-grained schistose rock of specific gravity 2.83. Lenticular masses of calcite up to 5 mm occur and there are also fine bands of calcite. Epidote occurs in a few small porphyroblasts.

In thin section the schistosity is pronounced and the minerals are sericite, albite, carbonates, epidote and a little penninite. Epidote also appears in granular masses. As in the rest of the core crenulation is common.

The rock is an epidote-albite-sericite schist.

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