Chapter 3
Sedimentary and Volcanic Rocks

Classification and Distribution

The volcanic rocks of the Tsuen Wan Volcanic Group are dominantly exposed in the northern and western parts of the Territory, where they form thick sheet-like successions of welded tuff, tuffite and intercalated volcanigenic sedimentary rocks. The group comprises four main formations, with the two oldest units also being exposed in the southern and eastern parts of the Territory. Rocks of the Tsuen Wan Volcanic Group are genetically related to the plutonic rocks of the Lamma Suite (Sewell *et al,* 1992). These rocks are thought to be of Middle to Upper Jurassic age.

Within the district, two formations of the Tsuen Wan Volcanic Group are represented; a lower, relatively uniform, lapilli-bearing coarse ash tuff of the Yim Tin Tsai Formation, and an upper, texturally variable, lapilli-coarse ash tuff of the Shing Mun Formation (Figure 7). The Shing Mun Formation includes the previously undefined Tsing Yan Member, which comprises a thermally metamorphosed black siltstone unit up to 50 m thick.

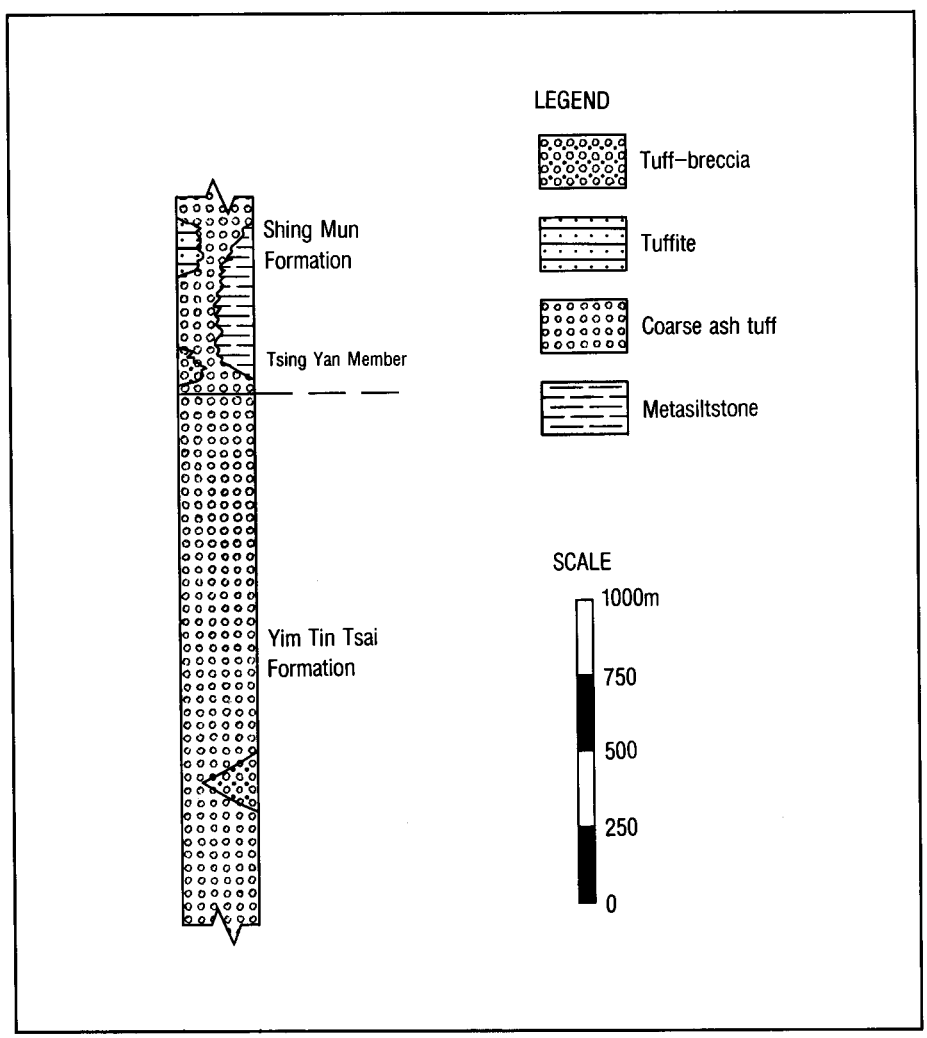

Figure 7 - Generalized Stratigraphic Section of the Tsuen Wan Volcanic Group Exposed on Tsing Yi

Yim Tin Tsai Formation

Lapilli-bearing coarse ash crystal tuff of the Yim Tin Tsai Formation is generally rhyodacitic in composition (Plate 2). The formation is typically massive in outcrop but may occasionally exhibit a flow fabric. Near the top of the succession, crude bedding is apparent and there are very rare intercalated granite breccia horizons (Plate 3). Granite clasts from these breccia horizons are identical in composition to granite exposed in the Po Toi islands to the southeast. The breccia horizons and crude bedding indicate a general northwestward dip. Flow-foliated lava clasts may reach up to 150 mm in diameter and have sharp edges. Petrographically, the Yim Tin Tsai tuff contains relatively equal proportions of quartz and alkali feldspar (c. 20%), subordinate plagioclase (2-8%), biotite (c. 10%) and minor amphibole (c. 2%) set in a microcrystalline matrix (c. 60%) comprising these minerals along with trace accessories of zircon, apatite, monazite and magnetite. Lithic fragments generally comprise less than one percent of the total rock composition. The overall thickness of the Yim Tin Tsai Formation succession on Tsing Yi is estimated to be 1750 m.

Shing Mun Formation

The contact between the Yim Tin Tsai Formation and overlying Shing Mun Formation is gradational. Unlike the Yim Tin Tsai Formation, the Shing Mun Formation is much more texturally and compositionally variable. Typically, it is composed of a lapilli-bearing coarse ash tuff but may vary from tuffaceous breccia to porphyritic dacite lava (Plate 4). Modally, the Shing Mun rocks generally have a higher proportion of plagioclase than the Yim Tin Tsai Formation. In the central part of northern Tsing Yi, a black siltstone unit within the Shing Mun Formation is defined here as the Tsing Yan Member (Plate 5).

Tsing Yan Member

The type locality of the Tsing Yan Member is at the Tsing Yan temporary housing estate in northern Tsing Yi (2790 2430). The member is exposed in the slope adjacent to the housing estate and nearby drillholes have proved a minimum thickness of 50 m. The siltstone has been metamorphosed to hornfels by the adjacent granodiorite intrusion and contains sparse horizons of granite breccia. The member dips at 30 degrees to the northwest.

Plate 2 - Coarse Ash Crystal Tuff of the Yim Tin Tsai Formation Exposed at Shek Wan (2735 2306) Containing a Clast of Porphyritic Lava

Plate 3 -

Steeply-dipping Yim Tin Tsai Formation Tuff Containing Intercalations of Granite Breccia Exposed in a Cutting at Sai Tso Wan (2756 2279)

Environment of Deposition of the Tsuen Wan Volcanic Group

The remarkably uniform texture and composition of the Yim Tin Tsai Formation, together with its broad areal distribution, suggests that the unit may have been deposited as a single pyroclastic flow. By contrast, the texturally variable Shing Mun Formation appears to represent the accumulation of several eruption units. The Tsing Yan Member probably represents a lacustrine deposit that formed during a period of relative volcanic quiescence.

As a result of structural disturbance by subsequent plutonic intrusions, bedding attitude of the volcanic deposits cannot be reliably used to infer the direction of source. However, regional geology considerations suggest that the thickness of the Tsuen Wan Volcanic Group is greatest in the vicinity of Tai Mo Shan to the north of the district. This, together with the abundant volcanic breccia exposed on the flanks of Tai Mo Shan (Addison, 1986; Langford *et al*, 1989), suggests that the central New Territories may have been the source area of the Tsuen Wan Volcanic Group.

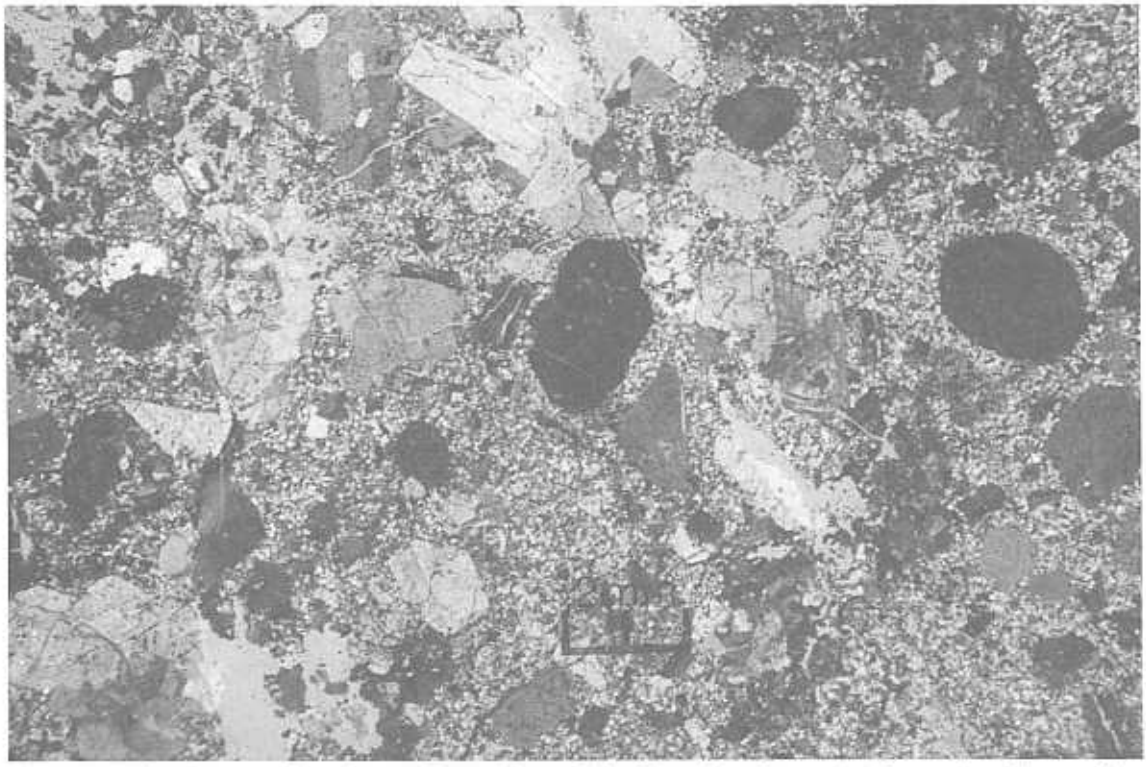

Plate 4 - Thin Section of Porphyritic Dacite Lava of the Shing Mun Formation Exposed at Cheung Shue Tau (2800 2463); XPL

Plate 5 - Black Siltstone of the Tsing Yan Member Exposed Adjacent to the Tsing Yan Temporary Housing Estate (2790 2430)