



Figure 17. Stereoplot of fold hinge-line plunges, whole area. Seventeen points.

In the Hellyer-Mt Charter area, the apparent localisation of quartz porphyry intrusive bodies by fractures associated with the Henty Fault also suggests that the fault was active in the Cambrian. The porphyry bodies are cleaved and affected by later movements and deformation on the Henty Fault.

The Que River and Hellyer massive sulphide bodies are both located approximately one kilometre from the HFZ. Footwall alteration zones of the two orebodies are steeply to vertically dipping (cross-cutting stratigraphy), and strike approximately NNE. Faulting on a NE to NNE trend has also influenced the location of the Hellyer orebody (the Jack Fault of McArthur, 1986). It is suggested that fractures associated with the Henty Fault system localised the transportation of hydrothermal fluids and acted as feeder zones during deposition of the massive sulphides. Hydrothermal activity along these fractures persisted well after deposition of the sulphides, as evidenced by sericite-fuchsite alteration extending at least 200 m into the hangingwall of the orebodies.

The Mt Charter Fault

The NNW- to NW-trending Mt Charter Fault forms the southern boundary to the bulk of Que-Hellyer Volcanics in the Mt Charter area. The fault shows a number of fairly sharp changes in trend - mostly well controlled from surface costein exposures - suggesting that it has been affected by later deformations. The north-western extremity of the fault is located in thickly-forested, poorly-accessible country west of the Murchison Highway, and its position has not been accurately fixed in this area.

Where exposed, the fault zone is typically evident as a zone of brecciation, clay pug development, and sericitisation up to several metres wide. Intense minor faulting and shearing related to the fault may extend up to 50 m on either side of the main fault zone.

Drill hole MCH-2A (fig. 5, 7) was drilled to determine the attitude and nature of the Mt Charter Fault in the vicinity of the South Charter track. The hole penetrated some 275 m of Animal Creek Greywacke, and intersected some 4.5 m of quartz-feldspar porphyry at the position of the Mt Charter Fault, before entering the Que-Hellyer Volcanics on the north side. The porphyry body has an irregular, welded contact against shale of the Animal Creek Greywacke, and contains a 300 mm-long inclusion of black shale, also with irregular, welded contacts. The nature of the contacts strongly suggests that the porphyry has intruded the shale. The contact between the porphyry body and a lava unit of the Que-Hellyer

Volcanics is marked by an unbroken, unsheared quartz-carbonate vein, 50 mm wide.

The lack of intense shearing or brecciation within the porphyry body, and the welded, intrusive nature of its contacts, strongly suggests that it intruded up the fault zone after the initial fault movements. This may have had the effect of sealing or locking the original fault plane, such that subsequent movements were accommodated by shears within the Animal Creek Greywacke. A significant fault zone with puggy clay development and associated quartz-veining occurs within the greywacke one metre uphole from the porphyry body, and another probable fault zone one metre or so further uphole (see logs, Appendix B). A small body of similar quartz-feldspar porphyry was noted outcropping on the South Charter track near the position of the Mt Charter Fault 100 m east of the MCH-2A collar position, and may well be continuous with that intersected in the drill hole.

Extrapolation of the intersection position of the Mt Charter Fault in MCH-2A to the surface position of the fault (fig. 7) indicates a northerly dip of about 70° for the fault plane. The fault in this area has an E-W trend (fig. 5), and there is a possibility that it represents a secondary cross-fault which has offset the original NNW-trending structure. However, the lack of evidence for any continuation of the cross-fault (e.g. it does not appear to affect the Central Volcanic Sequence boundary), and the occurrence of quartz-feldspar porphyry on the fault in the drill intersection and also further east on surface, strongly suggests that the trend change is due to folding of the original structure.

A sub-vertical or steep northerly dip for the Mt Charter Fault suggests it is a normal fault associated with tensional subsidence of the basin containing the Que-Hellyer Volcanics. The pronounced thickness change in the Que-Hellyer Volcanics across the fault - from 500 m or more in the vicinity of Mt Charter to 200 m or less in the Sock Creek area - strongly suggests that the structure was active during eruption and deposition of the Que-Hellyer sequence.

SYNTHESIS AND DISCUSSION

1. A complete and well exposed section of the younger part of the Mt Read Volcanics, between the Central Volcanic Complex below and the Owen Conglomerate above, is available in the Mt Charter-Hellyer-Mt Cripps area. The major part of the sequence is correlated with the Dundas Group, and has been subdivided into four main units - Animal Creek Greywacke at base, Que-Hellyer Volcanics, Que River Shale, and Southwell Subgroup at the top. A volcanoclastic conglomerate-sandstone sequence correlated with the Tyndall Group occurs between the Southwell Subgroup and the Owen Conglomerate.
2. The Central Volcanic Complex in the area is dominated by massive felsic lavas and pyroclastics, including fiamme-bearing units resembling ignimbrites. Sedimentary rocks are absent, and the sequence may be largely subaerial.
3. The Animal Creek Greywacke comprises several hundred metres of greywacke, shale and vitric ash, indicating a major change in conditions from the active, possibly subaerial, volcanism of the Central Complex. Much of the greywacke is quartz-mica-rich and of Precambrian derivation, implying a significant hiatus in volcanism when the marine basin was flooded with Tyennan detritus carried by turbidity currents. The micaceous quartzwacke sequence may correlate with other quartzwacke units known from the lower part of the Dundas Group, e.g. the Stitt Quartzite of the Rosebery area, and the quartzwacke-conglomerate unit on Howards Road south-west of Mt Read (Corbett

687

5265 R