SAMPLE NUMBER: 622277 MAC-33, 753.3m

SUMMARY:

This is a quite strongly altered (silica-chlorite-pyrite±calcite), weakly plagioclase-phyric, formerly glassy silicic andesite lava, originally very similar petrographically to 622276.

HAND SPECIMEN:

Despite coming from 77m deeper in the hole, this sample is very similar to the preceding rock in hand specimen, except for a weak network of very fine fractures, and probably a larger volume of more altered (inter-fragment) material than 622276.

THIN SECTION:

The protolith of this sample was almost certainly identical to that of the preceding sample 622276. It was a totally glassy, weakly plagioclase-phyric andesitic to dacitic rock with well-preserved perlitic cracks, albitized plagioclase phenocrysts (with some clayey alteration), and a weak hyaloclastitic texture. However, this sample has been notably more altered than 276, with coarsening of the chloritic seams that nucleate along the perlitic cracks, and far more common and coarser-grained polygonal secondary silica. Streaky calcite is more common than in 276, and disseminated idiomorphic pyrite crystals to almost 0.5mm across are not uncommon. The latter sometimes have rims and pressure fringes of green chlorite.

The texture is now definitely a false-brecciated texture, and it is not possible to judge whether this is simply an amplification of an original hyloclastite texture, or solely due to alteration of a more massive glassy lava flow. I would suggest that the former is more likely.

SAMPLE NUMBER: 266678, MAC-33 791.4m

SUMMARY:

This is a silicic andesite lava with moderate silica-chlorite alteration, and is similar in most respects to the two preceding samples except that it was less glassy, and apparently more massive than 622276 or 622277.

HAND SPECIMEN:

This is a dark grey, sparsely plagiolcase-phyric meta-andesitic lava with irregular alteration banding of lighter-coloured, finer-grained material, and a few calcite veinlets.

THIN SECTION:

This is a quite altered and recrystallized sparsely plagioclase-phyric andesitic lava. Former plagioclase phenocrysts make up around 1-3 modal% of this sample, and are totally albitized subhedral prisms usually less than 0.5mm long. Most have been almost completely replaced by very fine-grained sericite. There are no mafic phenocrysts in this rock, but small apatite microphenocrysts are not uncommon, and totally leucoxene-altered FeTi oxide phenocrysts are common.

The groundmass of this sample was weakly vesicular, glassy to vitrophyric, being composed of glass charged with tiny acicular plagioclase microlites. The glass has devitrified and crystallized to a patchy mosaic quartzo-feldspathic intergrowth, and conatins abundant very fine-grained sericite and common chlorite, plus many small angular patches of secondary quartz. Former vesicles are filled by polygonal quartz, and minor chlorite and epidote. The streaky to banded nature nature of the silica-chlorite alteration, best defined by modal variation in chlorite abundance, produces almost a weak schistosity in the rock, although the hand specimen lacks any sign of a weak parting. Calcite veinlets are also quite common.

This sample was, like 276 and 277, a silicic andesite lava. To me, it contains more chlorite (in a rock in which the chloritization is not pronounced) than typical MRV dacites, and in that respect is closer to an andesite. However, the abundant quartzo-feldspathic groundmass, the absence of mafic phenocrysts, and the relative paucity of plagioclase phenocrysts, are all features more typical of dacites. I suggest that it falls somewhere along the andesite to dacite spectrum.

SAMPLE NUMBER: MAC 33 622291 813.2m

SUMMARY: This rock is probably a former lithic crystal tuff composed of small fragments (<2mm) of glassy plagioclase-phyric andesitic lava, and vitric ash. It has suffered strong chlorite-epidote alteration.

HAND SPECIMEN:

This is a strongly altered dark green plagioclase-phyric andesitic lava or crystal lithic tuff.

THIN SECTION DESCRIPTION:

This sample is a difficult one to diagnose with certainty, due to strong alteration obliterating the primary texture to the extent that it is not immediately obvious whether this is a lava or a lithic crystal tuff. The rock certainly contains four or five distinct lithic fragments to about 2mm long, with quartzo-feldspathic groundmasses, small plagioclase phenocrysts and abundant secondary magnetite, but the remainder of the rock appears at first to have been a plagioclase-phyric glassy andesitic lava. Plagioclase phenocrysts are totally replaced by dense sericite, and there appear to have been few if any former mafic phenocrysts.

The groundmass of the rock is unusual. It was evidently largely glassy, and is now composed of an almost isotropic material probably made up of fine-grained epidote and chlorite, with a fine sericite web pervading it. Textural changes in the isotopic material are sudden, and suggest a fragmental texture in many places. I suggest that this was a lithic crystal tuff composed of small lapilli-sized fragments of glassy andesite in a matrix of vitric ash, all of which have totally altered to the same messy epidote-chlorite material upon devitrification and alteration.

MAC-33, and a Comparison With MAC-26

I looked again at the eight samples provided from MAC-26. SAmples 431561, 56 and 88 are very similar, highly altered formerly glassy sparsely plagioclase-phyric dacitic lavas and could be from the same unit, although I not on the log provided that 88 is separated from the other two by apparent lenses of basalt. Also, I don't think that sample 61 is very typical of the Epiclastic (Mixed Sequence?).

The key question is whether there is stratigraphic continuity between MAC-33 and MAC-26, or whether a major fault separates these sequences. It needs to be kept in mind that the very strong alteration of MAC-26 samples might mask any original similarity.

I note that MAC-33 samples below 622283 are logged as 'Feldspar-phyric Andesite and Basalt'. In my opinion, only 283 and 284 are really andesitic, the remainder being typical glassy dacites. Clearly, the Lower Basalt is absent from this section (MAC-33), and andesites that overlie the greywackes in the deep Placer hole BRD-01A are also absent. The massive dacitic lavas that dominate the lower section of MAC-33 are similar to those in in the lowest part of Placer Hole BRD-05, and it is difficult to identify a correlate of the Mixed Sequence in both holes.

Both MAC-33 and MAC-26 have common dacitic lavas, and *it is essentially impossible to determine petrographically whether these represent the same unit(s)*. The intense hydrothermal alteration of the MAC-26 sequence makes this even more difficult. However, one major consideration suggests to me that the MAC-33 and MAC-26 sequences are most unlikely to be correlated. Further north, in the area of the former Placer deep holes, dacites are dominant only in the base of the holes(>800m deep), and are rare or absent in the upper part of the sequence, which is dominantly basaltic. An andesitic unit separates the dacites from the micaceous greywacke in BRD-01A. In contrast, it appears that dacites dominate *the upper part* of MAC-26, and are underlain by a significant thickness of andesite and basalt. A direct correlation would seem unlikely unless there are profound and rapid thickness changes across the structure postulated to exist between MAC-33 and MAC-26 on the section provided.

In summary, both MAC-33 and MAC-26 contain significant intersections of formerly glassy dacitic lavas. It is not possible *petrographically* to prove or disprove a correlation between these seqences. However, the absence of the Feldspar-phyric Andesite and Lower Basalt units below the dacites in MAC-33, and their strong development below dacites in MAC-26, argues for a major structural dislocation between the two drill holes. This structure, parallel to but east of the Mount Charter Fault, may have been a growth fault at the margin of (and perhaps providing access for) one or more major domes of glassy dacite that were the focus of significant hydrothermal alteration. The structure is shown on the section provided as being closer to MAC-33. However, the strong alteration of MAC-26 relative MAC-33 in similar lavas suggests that the structure controlling the alteration was probably further to the northeast than shown in the section.