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Detailed petrological examination of
two rock samples from Tasmania.

Report No: A17/18/1789

5 July, 2019

For: Anchor Resources Limited

Dr B.J. Barron
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Sample No. 837-S-01

Rock Type Partly selectively altered and finely recrystallised vitric tuff, containing irregularly disseminated, fractured and partly broken feldspar phenocrysts. It is derived from a feldspar porphyritic, acidic (possibly ?dacitic) volcanic source.

Hand Specimen A fine grained, mottled, mid to pale red-brown sample containing irregularly disseminated medium grained and some coarse grained, pale grey ?feldspar crystal sites and aggregates. Irregular shaped pink domains are ?separated by irregular narrow branching domains that are dark green-grey and fine grained. Many appear to be lensed. Pink domains most likely represent lithic fragments/clasts. The largest of these reaches about 3 cm across in the present sample. The sample lacks penetrative veins and lacks reaction with cold dilute HCl.



Photo numbers P7040316; 317. Sawn surface of sample 837-S-01 showing pink (?hematite dust-bearing) domains and pale grey subprismatic feldspar microphenocryst sites. Dark green-grey domains are chlorite-rich.

Thin Section This sample has undergone partial selective alteration and partial fine grained recrystallisation but retains a clear pyroclastic vitric tuffaceous texture with irregularly disseminated fractured and partly broken feldspathic crystal fractions.

The crystal fraction accounts for about 20% of the present section area and has an uneven distribution. It has an average grain size of about 0.7 mm. Subhedral prismatic shaped plagioclase crystals predominate. These are unoriented and partly glomeroporphyritic. Some reach about 3 mm long and such larger crystals are mechanically deformed with zones of microbrecciation.

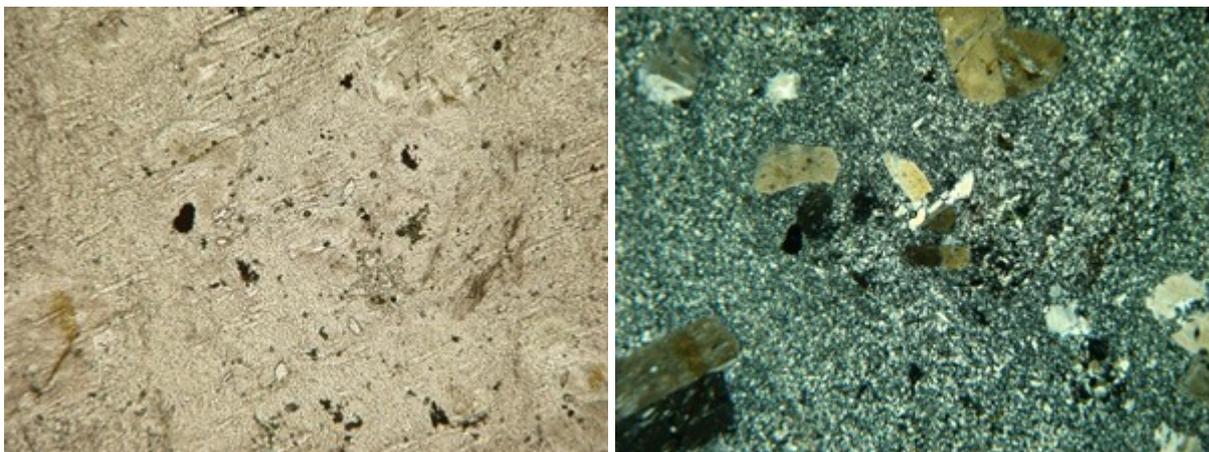


Photo numbers DSC00002; 003. Altered, broken feldspar phenocrysts are set in a finely devitrified/recrystallised quartzo-feldspathic rock matrix fraction. Plane and crossed polarised light. x4 objective, long dimension of photos is 1.9mm.

Smaller crystals are subhedral to angular and broken cleavage fragments. Glomeroporphyritic aggregates reach about 5 mm across in the present section. The feldspathic once-phenocrystic fraction comprises mainly ?albitised plagioclase and subordinate partly albitised and altered ?K-feldspar. This fraction lacks phenocrystic quartz in the present section. Some once-phenocrystic feldspars enclose accessory small crystals of zircon and apatite.

Faint outlines are preserved of sparse ?mafic sites of previous microphenocrysts. These are marked by subparallel wispy trails of dusty hematite \pm chlorite \pm granules of clouded sphene-leucoxene.

A very abundant rock matrix fraction has an average grain size of less than 0.02 mm. It comprises a recrystallised/polygonised/devitrified mosaic of intergrown alkali feldspar and quartz. This fraction is lightly dusted with minute hematite granules and contains minor irregular patches of carbonate. The carbonate lacks reaction with cold dilute HCl and most likely is not calcite. Carbonate also forms dense irregular patches and vein-like aggregates. Some patches may reflect previous differences in compositions/alteration of poorly defined volcanic lithic fragments.

In spite of fine ?devitrification/recrystallisation, this fraction retains in some domains, clear outlines of cusped **volcanic glass shards**. These outlines are very clear in domains adjacent to fractures that are chlorite-altered. The chlorite-altered fractures have wide haloes of chlorite-alteration into the host rock where it clearly outlines relict textures

of cusped and branching glass shards and small pumiceous fragments up to about 0.15 mm across.

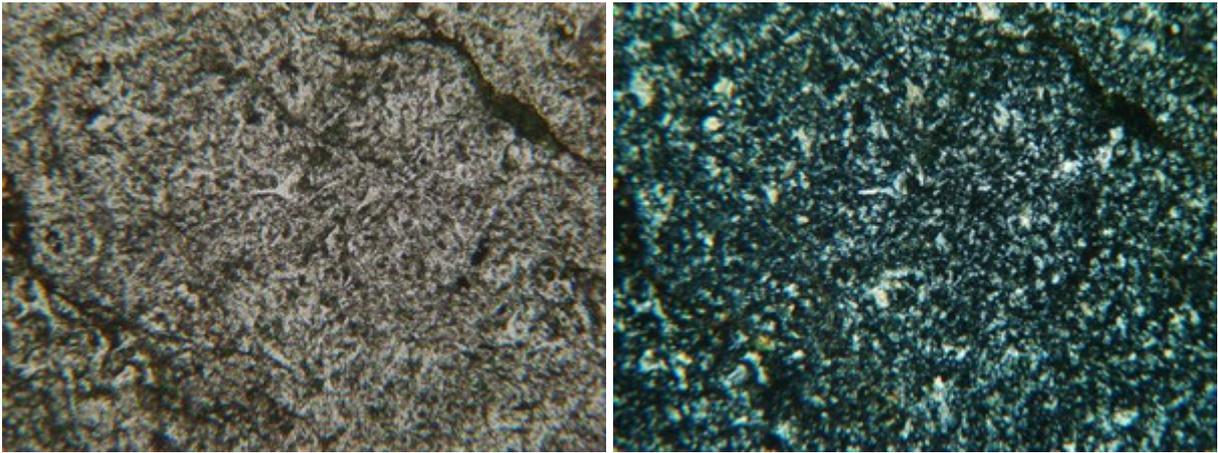


Photo numbers DSC00006; 007. Finely devitrified/recrystallised quartzo-feldspathic glass shards retain cusped and broken pumiceous, once-vesicular shapes. Plane and crossed polarised light. x10 objective, long dimension of photos is 1.0mm.

The dark green-grey lensed and branching domains of the hand specimen reflect branching fractures that bend around coarse and medium grained crystal fragments and poorly defined lithic fragments. In these domains chlorite is dark green and fine grained. Wispy 'sericite' is accessory.

The sample contains accessory small crystals and aggregates of oxidized ?pyrite that account for only about 1% to 2% of the present section area. The crystals and aggregates reach about 0.7 mm grain size in the present section. They are mainly black oxides with minor relict sulphide patches (?pyrite). Also accessory are yellow to reddish brown ?tourmaline patches containing fine irregular shaped grains less than 0.08 mm across.

This sample may be identified as partly selectively altered and finely recrystallised vitric tuff, containing irregularly disseminated, fractured and partly broken feldspar phenocrysts. It is derived from a feldspar porphyritic, acidic (possibly ?dacitic) volcanic source.

<u>Sample No.</u>	837-5-02
<u>Rock Type</u>	Coarsely devitrified, partly selectively altered and partly foliated, vitric tuff, containing abundant unsorted angular and broken

crystal- and once-glassy volcanic lithic fragments from a plagioclase- and sparsely quartz-porphyritic, acidic volcanic source.

Hand Specimen A fine grained, compact (non-friable), mid-grey sample that contains poorly defined, fine to medium grained, pale grey subprismatic feldspar crystal sites that are irregularly disseminated. The sample lacks conspicuous veins and does not react with cold dilute HCl, indicating that it lacks calcite. It appears to be weakly foliated.

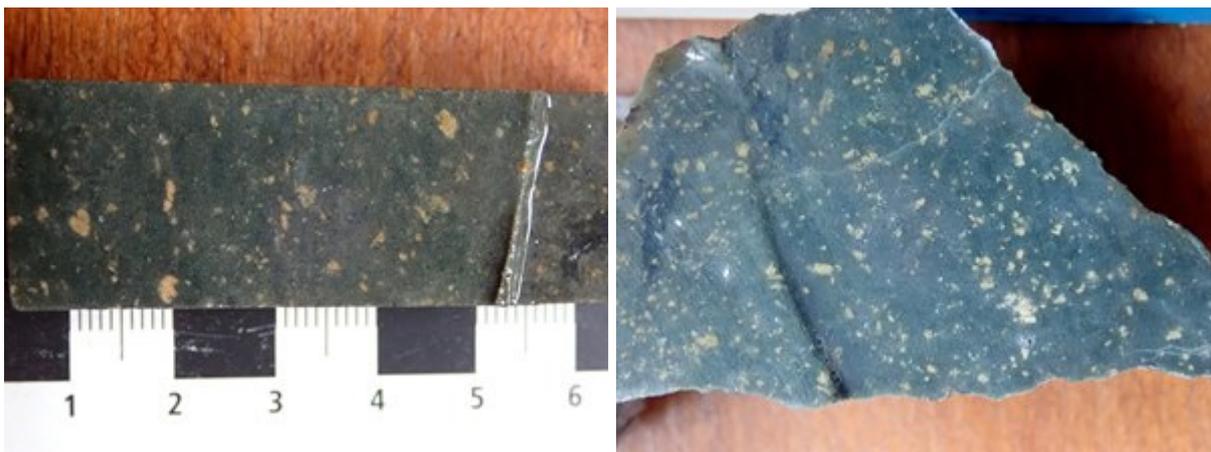


Photo numbers P7040318; 319. Sawn surface of sample 837-S-02 showing pale grey subprismatic feldspar microphenocryst sites set throughout a massive fine grained mid-grey rock matrix.

Thin Section This sample has undergone coarse devitrification, partial selective alteration and is partly foliated. Nevertheless, it retains a recognisable pyroclastic (tuffaceous) relict texture, defined by outlines of abundant unsorted angular and broken crystal- and once-glassy volcanic lithic fragments.

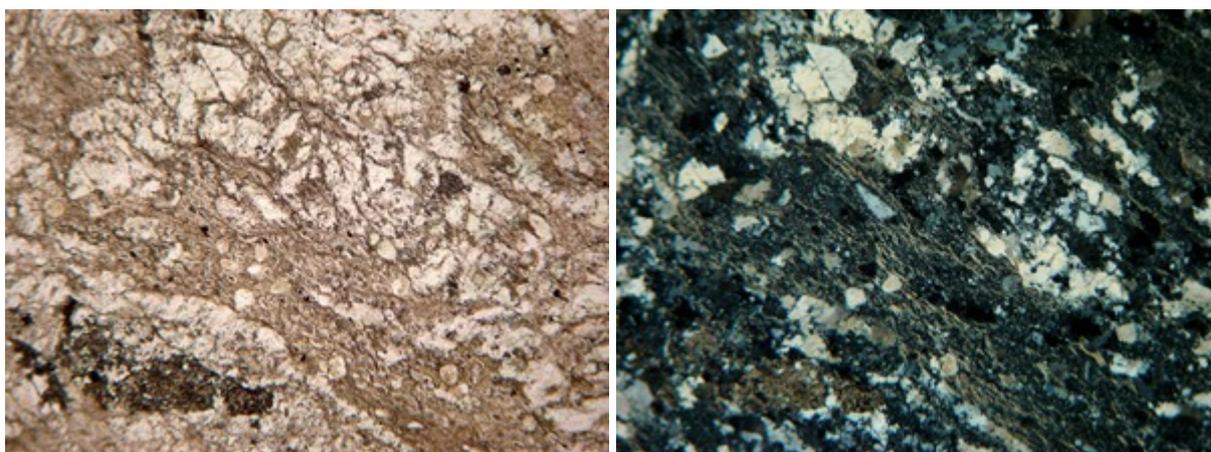


Photo numbers DSC00002; 003. Altered, broken feldspar and quartz phenocrysts are set in a rather coarsely devitrified/recrystallised quartzo-feldspathic rock matrix fraction. The finer fraction is weakly foliated. Plane and crossed polarised light. x4 objective, long dimension of photos is 1.9mm.

A recognisable crystal fraction accounts for about 25% of the

present section area. Subhedral shaped, and angular and broken crystal fragments have an uneven distribution throughout, and vary from less than 0.2 mm up to about 1.5 mm grain size in the present section. As in the previous sample 837-S-01, once-phenocrystic plagioclase predominates. The plagioclase is albitised, partly recrystallised and many crystals are bent, fractured and displaced or else shattered in situ. Sparse glomeroporphyritic aggregates are recognisable. Some crystals show partial selective alteration and patchy veinlets of pale yellow fine grained carbonate (not calcite).

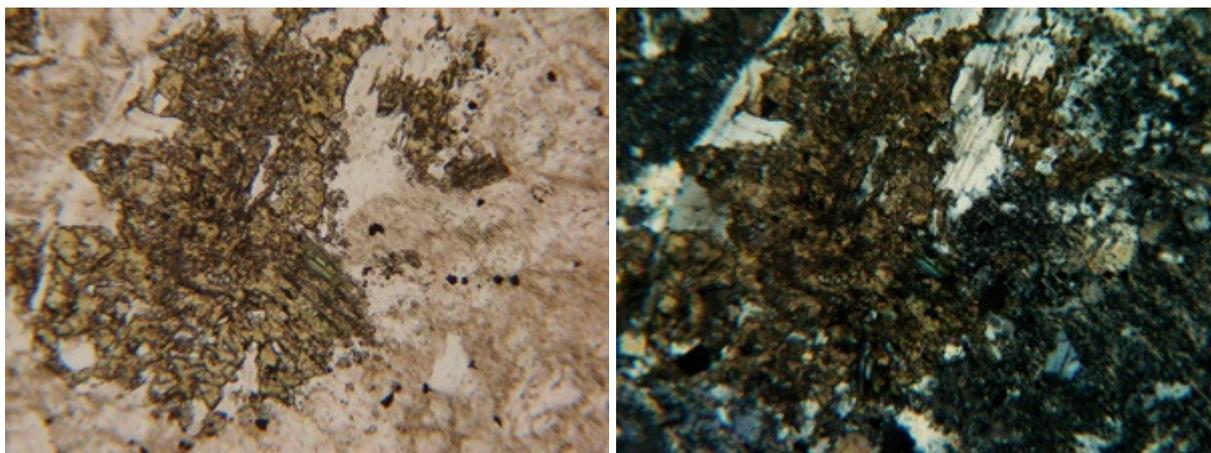


Photo numbers DSC00011; 012. Yellow-stained carbonate-altered, broken feldspar phenocryst and small green chlorite-altered ?biotite flake (lower centre), are set in a finely devitrified/recrystallised quartzo-feldspathic rock matrix fraction. Plane and crossed polarised light. x4 objective, long dimension of photos is 1.9mm.

Also present are sparse small microphenocrysts of quartz, some of which show magmatic resorption and/or angular fractures. Small accessory sites once could have contained ?biotite, now converted to chlorite and carbonate. Minor fine grained oxide crystal sites are opaque with very thin rims of sphene-leucoxene, indicating a titanian primary composition. Small zircon crystals are accessory.

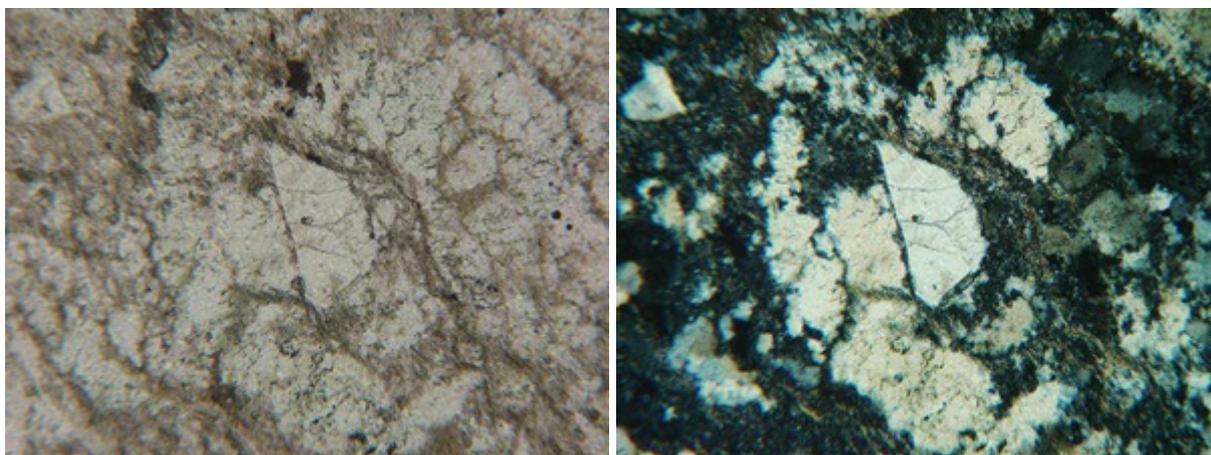


Photo numbers DSC00017; 018. Broken fragment of once-microphenocrystic quartz set in coarsely devitrified matrix. Plane and crossed polarised light. x4 objective, long dimension of photos is 1.9mm.

The abundant ‘rock matrix’ fraction consists mostly of very poorly defined, devitrified once-glassy, volcanic lithic fragments. Poor outlines of these show they are unoriented, deformed, devitrified and converted to patchy domains of irregular ragged secondary quartz, intergrown with almost equally abundant very fine grained clouded felsic domains clouded with wispy illite-‘sericite’ and green chlorite. Outlines of some fragments are elongate and somewhat ragged with poorly defined subparallel irregular-shaped alteration domains of quartz and feldspar-rich compositions. This suggests they once were fiammé.

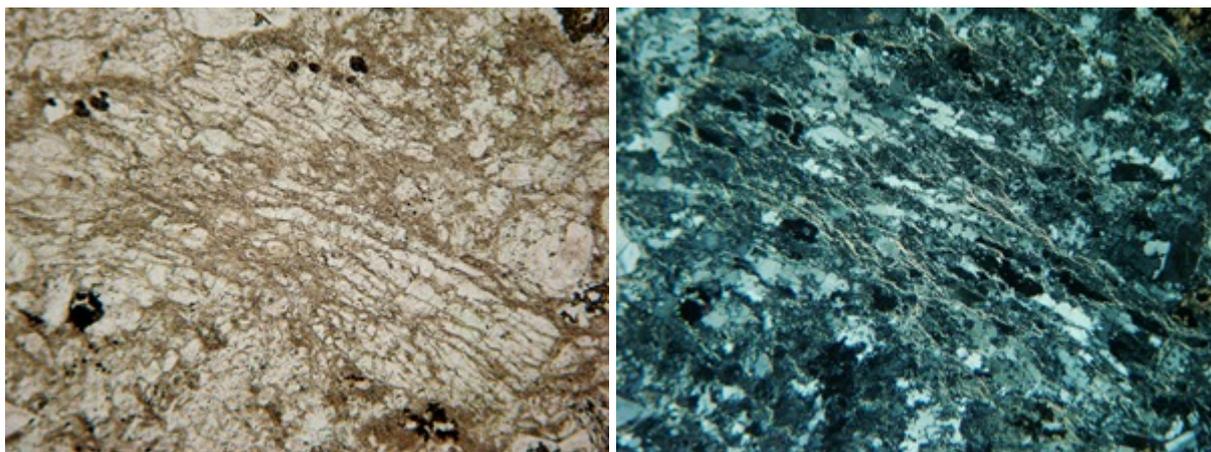


Photo numbers DSC00014; 015. Elongate outline of devitrified volcanic lithic fragment (fiammé). Alteration comprises quartz- and once-feldspar-rich domains. Plane and crossed polarised light. x4 objective, long dimension of photos is 1.9mm.

Also present are poorly defined deformed lithic fragments, up to about 4 mm across, retaining poor relict textures of previous cusped volcanic glass shards suggesting a vitric tuffaceous protolith. Sparse deformed lithic fragments were once glassy, plagioclase- porphyritic acid-intermediate volcanic lithic types. Elsewhere are patches of cryptocrystalline ?clay (?‘illite’-montmorillonite). This phase is common throughout the rock matrix fraction and wispy ‘illite’ defines a poor foliation direction.

A very approximate overall modal mineralogy is as follows: plagioclase ~ 25%; quartz 30%; clouded clay (?illite-montmorillonite) ~ 40%; carbonate ~ 5%; and accessory chlorite, oxides (\pm sulphides) and zircon.

This sample may be identified as coarsely devitrified, partly selectively altered and partly foliated, vitric tuff, containing abundant unsorted angular and broken crystal- and once-glassy volcanic lithic fragments from a plagioclase- and sparsely quartz-porphyritic, acidic volcanic source.