# PETROGRAPHIC REPORT ON TWO ROCK SAMPLES FROM WESTERN TASMANIA

For

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## SUMMARY

Two rock samples, labelled 133734 and 133735, from western Tasmania, were submitted for petrographic preparation, description and interpretation. The former sample was from an ore zone in Farrell Group sediments at the footwall of the Henty Fault. The latter sample is from the Central Volcanic Complex in the Tullah/Rosebery region in the hanging wall of the Henty Fault.

Since both samples contained sulphide minerals, polished thin sections were prepared. The sections were subsequently examined microscopically in transmitted and reflected light.

Summary descriptions of each sample are listed below:

**133734 PTS**

Summary: Hydrothermal breccia with a few intensely altered rock fragments, perhaps of original felsic volcanic (tuff) origin, replaced and surrounded by a hydrothermal infill assemblage. The breccia fragments have been replaced largely by quartz, with minor sericite and/or fine semi-fibrous amphibole, plus traces of pyrite, pyrrhotite, titanite and fluorite. The hydrothermal infill is dominated by fine grained, through to coarse grained aggregates of quartz, pyrite, arsenopyrite, semi-fibrous amphibole and fluorite. Tiny traces of rutile and galena are hosted in arsenopyrite, and chalcopyrite in pyrite. No particulate gold has been observed.

**133735 PTS**

Summary: Very strongly hydrothermally altered, recrystallised and weakly foliated felsic to intermediate tuff, perhaps originally of dominantly fine grained pumiceous material. The rock has been replaced by an assemblage of quartz and chlorite, with subordinate talc, minor porphyroblastic pyrite, a little tourmaline and rutile, and traces of chalcopyrite, sphalerite and galena. The latter sulphides are mostly restricted to occurrence in irregular veinlike masses with quartz and chlorite. The veinlike masses appear to be later than a weakly developed foliation and associated weak stylolite development and cross-cutting weak crenulation.

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The two samples represent very strongly altered and variably mineralised rocks of probable felsic to intermediate volcanic origin. In 133734, it is possible that hydrothermal brecciation has occurred, with resulting intensely altered fragments being replaced by, and enclosed in, a hydrothermal infill matrix. In this sample, the interpreted fragments have been replaced by a quartz-rich assemblage, with lesser amounts of sericite and amphibole, along with traces of fluorite, pyrite, pyrrhotite and titanite. The fragments may have ultimately been composed of a coarse felsic tuff. Infill in this sample is dominated by quartz, pyrite, arsenopyrite, fluorite and fine grained amphibole. Although there are tiny traces of galena and chalcopyrite associated with the main sulphides, no particulate gold was observed. Clearly, this sample has experienced metasomatic influx of silica, Fe, As, S and F. Sample 133735 is interpreted to represent a former intermediate to felsic composition tuff, perhaps dominated by fine pumiceous (vitric)

material. It has been very strongly hydrothermally altered and replaced by quartz and chlorite, with minor talc and pyrite, and a little tourmaline and rutile. There has been porphyroblastic growth of pyrite aggregates and emplacement of a few irregular veinlike masses of quartz and chlorite, with a little tourmaline and traces of chalcopyrite, pyrite, sphalerite and galena. This sample may have experienced metasomatic introduction of Mg (S, B).

**133734 PTS**

Summary: Hydrothermal breccia with a few intensely altered rock fragments, perhaps of original felsic volcanic (tuff) origin, replaced and surrounded by a hydrothermal infill assemblage. The breccia fragments have been replaced largely by quartz, with minor sericite and/or fine semi-fibrous amphibole, plus traces of pyrite, pyrrhotite, titanite and fluorite. The hydrothermal infill is dominated by fine grained, through to coarse grained aggregates of quartz, pyrite, arsenopyrite, semi-fibrous amphibole and fluorite. Tiny traces of rutile and galena are hosted in arsenopyrite, and chalcopyrite in pyrite. No particulate gold has been observed.

Handspecimen: The sample is composed of a strongly mineralised rock that displays an apparent crudely brecciated texture. Irregular fragments up to 1-2 cm across of quartz-rich (silicified) rock grade into, and are surrounded by crystalline quartz, medium grained pyrite, a silvery sulphide (probably arsenopyrite) and irregular pale greenish aggregates of fine grained ?chlorite. The sample is essentially non-magnetic, with susceptibility of $<10 \times 10^{-5}$ SI units.

Petrographic Section:

a) Primary mineralogy and textures: In the section, it is apparent that much of the sample comprises hydrothermal infill material. However, there are irregular relict domains up to 1.5 cm across that may represent intensely altered fragments within a hydrothermal breccia. The altered fragments constitute about 20 volume % of the sample and have been mostly recrystallised. However, in places, there are relict textures after possible former lithic fragments up to 2.5 mm across and a few relict quartz grains up to 0.6 mm across (maybe former phenocrysts). From these textural vestiges, the fragments in the breccia are interpreted as representing a former felsic volcanic rock, probably a rather coarse tuff.

b) Alteration and structure: It is interpreted that the original felsic volcanic rock underwent intense hydrothermal alteration and subsequent brecciation. Fragments were replaced by dominant fine to medium grained quartz, in places accompanied by significant amounts of fine grained sericite, or by pale brownish, semi-fibrous amphibole, plus traces of fluorite, pyrite, pyrrhotite and titanite. A weak foliation is apparent in some altered fragments, defined by preferred orientation of sericite and quartz. The margins of breccia fragments are replaced by the adjacent hydrothermal infill assemblage, in-between the altered fragments. The infill is heterogeneous and include aggregates up to several millimetres across that are dominated by one or more of fine grained through to coarse grained quartz, pyrite, arsenopyrite and fluorite, as well as by aggregates of fine grained pale green-brown semi-fibrous amphibole. A trace of turbid brownish carbonate is locally present. Much of the infill is unstrained and evidently has filled open space. Subhedral crystals of quartz, pyrite and arsenopyrite are common and quartz prisms project into aggregates of colourless fluorite and amphibole. Sulphides occur as disseminations and as semi-massive aggregates up to 2-3 cm across, intergrown with quartz, fluorite and amphibole.

c) Mineragraphy and paragenesis: There is relatively abundant, irregularly distributed pyrite and arsenopyrite in the sample, forming aggregates up to 2-3 cm across, as well as disseminations. Sulphides mostly occur in the hydrothermal infill, but traces of pyrrhotite and pyrite are found in the altered fragments. Pyrrhotite in the fragments has been largely replaced by fine grained (secondary) pyrite. In the hydrothermal infill, pyrite and arsenopyrite are commonly subhedral, forming individual grains up to 2-3 mm across. However, pyrite also occurs in less common, fine grained aggregates, probably pseudomorphous after former pyrrhotite. Aggregates of these minerals are common and display fracturing. Tiny rare grains of chalcopyrite are hosted in pyrite, and galena and rutile occur very rarely in arsenopyrite. No particulate gold has been observed in the sample.

Mineral Mode: Approximate modal proportions are: quartz 60%, pyrite, arsenopyrite and amphibole each 10%, fluorite 5%, sericite 4% and traces of titanite, carbonate, rutile, chalcopyrite and galena.

Interpretation and Comments: It is interpreted that the sample is a type of hydrothermal breccia containing a few intensely altered rock fragments, perhaps of original felsic volcanic (tuff) origin. The breccia fragments have been replaced largely by quartz, with minor sericite and/or fine semi-fibrous amphibole, plus traces of pyrite, pyrrhotite, titanite and fluorite. Breccia fragments have been marginally replaced and surrounded by a hydrothermal infill assemblage. The latter is dominated by fine grained, through to coarse grained aggregates of quartz, pyrite, arsenopyrite, semi-fibrous amphibole and fluorite. Tiny traces of rutile and galena are hosted in arsenopyrite, and chalcopyrite in pyrite. No particulate gold has been observed.

**133735 PTS**

Summary: Very strongly hydrothermally altered, recrystallised and weakly foliated felsic to intermediate tuff, perhaps originally of dominantly fine grained pumiceous material. The rock has been replaced by an assemblage of quartz and chlorite, with subordinate talc, minor porphyroblastic pyrite, a little tourmaline and rutile, and traces of chalcopyrite, sphalerite and galena. The latter sulphides are mostly restricted to occurrence in irregular veinlike masses with quartz and chlorite. The veinlike masses appear to be later than a weakly developed foliation and associated weak stylolite development and cross-cutting weak crenulation.

Handspecimen: The handspecimen is composed of a fine grained, dark grey-green, strongly altered rock, with scattered porphyroblastic masses of pyrite up to 2-3 mm across. The rock contains quartz and chlorite and has a weak, irregular (maybe folded) foliation. The sample is essentially non-magnetic, with susceptibility of $<10 \times 10^{-5}$ SI units.

Petrographic Section:

a) Primary mineralogy and textures: In the section, it is evident that the rock is fine grained, very strongly hydrothermally altered and recrystallised. Relict texture is poorly preserved, but it can be inferred that the rock may have been a type of fine grained volcanic fragmental, perhaps a pumiceous tuff, but with a few scattered relict quartz grains up to 0.2 mm across. Apart from possible relict quartz, no other primary minerals are recognised. From the relict characteristics and alteration assemblage, it is speculated that the rock may have been of intermediate to felsic volcanic composition.

b) Alteration and structure: The original rock has been very strongly hydrothermally altered, with probable imposed deformation and recrystallisation effects. There has been replacement by a generally fine grained, irregularly foliated assemblage dominated by pale green chlorite and quartz (grainsize up to 0.2 mm), with subordinate amounts of flaky talc, a little disseminated fine grained rutile and tourmaline, and trace pyrite and chalcopyrite. Scattered irregularly throughout are fine to medium grained porphyroblastic aggregates of pyrite up to 2.5 mm across, in which pyrite is intergrown with quartz, chlorite and talc. A weak foliation in the rock is defined by preferred orientation of chlorite and talc grains, along with wispy fine grained stylolitic aggregates of rutile. In places, the foliation is evidently weakly folded, as well as being intersected at a high angle by a weak crenulation. The rock has been cut by several veinlike masses, grading to irregular aggregates, up to 1 mm wide, that are generally transgressive to the foliation and have extensional characteristics. The masses are rich in fine to medium grained quartz, with subordinate amounts of chlorite, a little tourmaline and traces of pyrite, chalcopyrite, sphalerite and galena.

c) Mineragraphy and paragenesis: The rock contains scattered fine to medium grained pyrite porphyroblastic aggregates up to 2.5 mm across. Veinlike masses of quartz-chlorite contain traces of fine grained pyrite, chalcopyrite, sphalerite and galena, including a few composite aggregates of pyrite-chalcopyrite-sphalerite.

Mineral Mode: Approximate modal proportions are: quartz 50%, chlorite 40%, talc 6%, pyrite 2%, rutile and tourmaline each 1% and traces of chalcopyrite, sphalerite and galena.

Interpretation and Comments: It is interpreted that the sample is a very strongly hydrothermally altered intermediate to felsic volcanic rock, perhaps of fine pumiceous tuff origin. The rock has been replaced by a hydrothermal alteration assemblage of quartz and chlorite, with subordinate talc, minor porphyroblastic pyrite, a little tourmaline and rutile, and traces of chalcopyrite, sphalerite and galena. Subsequently, a weak foliation and cross-cutting weak crenulation were imposed and a few veinlike to irregular aggregates of quartz-chlorite (-trace pyrite-chalcopyrite-sphalerite-galena) were emplaced.