

**PETROGRAPHIC REPORT ON A SMALL DRILL CORE  
SAMPLE FROM THE BALFOUR AREA, NORTHWEST  
TASMANIA**

For

McArthur Ore Deposit Assessments Pty Ltd

Reference: Email from Richard de Bomford 13-8-10 and sample receipt 18-8-10

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**Report #648**

A handwritten signature in blue ink, appearing to read 'P. M. Ashley'.

## SUMMARY

A single small piece of drill core and accompanying thin section were submitted for petrographic examination and interpretation. The sample was identified as from DDH0415.02 at 99.1 m downhole. It was stated to have come from a dyke in the Rocky Cape Group near Balfour in northwest Tasmania.

The section offcut was measured for magnetic susceptibility and also tested with dilute HCl to check carbonate speciation. The section was examined microscopically in transmitted and oblique reflected light. A couple of photomicrographs were taken to illustrate mineralogical and textural features.

A summary description of the sample follows:

### **DDH 0415.02 99.1 m TS**

Summary: Very strongly hydrothermally altered porphyritic and amygdaloidal fine grained mafic igneous rock, probably of basaltic character. The original rock is interpreted to have contained scattered phenocrysts of feldspar (e.g. plagioclase) and clinopyroxene in a fine grained groundmass of feldspar, ferromagnesian material and minor FeTi oxide. A weak flow foliation is preserved in relict texture and there are a few irregular to elongate amygdules. Pervasive alteration has caused complete replacement of the igneous rock and development of generally fine grained carbonate (dolomite/ankerite) and chlorite, with subordinate quartz and a serpentine mineral (the latter two mostly at former feldspar sites and in amygdules). FeTi oxide was replaced by leucoxene and there are also traces of hematite, pyrite and chalcopyrite as alteration phases. The original rock was probably not of lamprophyric type, assuming that it contained feldspar phenocrysts.

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### **Comment**

The sample is interpreted to represent a very strongly hydrothermally altered porphyritic and locally amygdaloidal, fine grained mafic igneous rock, most likely of basaltic composition. From relict textures it is indicated that the rock contained feldspar (probably plagioclase) and ferromagnesian (probably clinopyroxene) phenocrysts, in a fine grained groundmass. The presence of phenocrystal feldspar in the original rock would indicate that the rock was not of lamprophyric type, as lamprophyres by definition do not contain phenocrysts of feldspar (with feldspar restricted to the groundmass).

The alteration assemblage, including infill of amygdules, is dominated by carbonate (ankerite/dolomite) and chlorite, with minor quartz, a serpentine mineral and leucoxene. There are also traces of hematite, pyrite and chalcopyrite. The alteration assemblage is of propylitic type, perhaps forming under low grade metamorphic conditions.

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A detailed description of the sample, with photomicrographs, follows.

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**Summary:** Very strongly hydrothermally altered porphyritic and amygdaloidal fine grained mafic igneous rock, probably of basaltic character. The original rock is interpreted to have contained scattered phenocrysts of feldspar (e.g. plagioclase) and clinopyroxene in a fine grained groundmass of feldspar, ferromagnesian material and minor FeTi oxide. A weak flow foliation is preserved in relict texture and there are a few irregular to elongate amygdules. Pervasive alteration has caused complete replacement of the igneous rock and development of generally fine grained carbonate (dolomite/ankerite) and chlorite, with subordinate quartz and a serpentine mineral (the latter two mostly at former feldspar sites and in amygdules). FeTi oxide was replaced by leucoxene and there are also traces of hematite, pyrite and chalcopyrite as alteration phases. The original rock was probably not of lamprophyric type, assuming that it contained feldspar phenocrysts.

**Handspecimen:** The drill core sample is composed of a pale brownish-grey, fine grained, strongly altered rock. There appears to be dominant carbonate, with scattered dark grey-green aggregates of chlorite up to a few millimetres across. Slightly coarser crystalline carbonate is associated with the chlorite aggregates. No diagnostic textures are apparent in handspecimen. Testing of the sample with dilute HCl did not cause a reaction, suggesting that the carbonate is dolomite or ankerite. The sample is very weakly magnetic, with susceptibility up to  $40 \times 10^{-5}$  SI units.

#### **Petrographic description**

a) Primary rock characteristics: In the section, relict porphyritic and possible amygdaloidal texture is moderately well preserved. The rock exhibits pseudomorphs after two different types of phenocryst up to ~2 mm across, as well as a few possible amygdules up to 4 mm across, set in a fine grained, originally holocrystalline groundmass. The latter shows possible weak relict flow foliation, with alignment of pseudomorphs after phenocrysts. Relict shapes of the pseudomorphs imply that there were original phenocrysts of feldspar (e.g. plagioclase) and a blocky ferromagnesian phase (e.g. clinopyroxene) (Figs 1, 2). The groundmass, comprising 60-70% of the sample was fine grained and contained abundant feldspar as small laths, with interstitial ferromagnesian material and minor disseminated FeTi oxide. From the relict characteristics, the rock is interpreted as representing a former porphyritic and amygdaloidal fine grained mafic igneous type, most likely of basaltic composition.

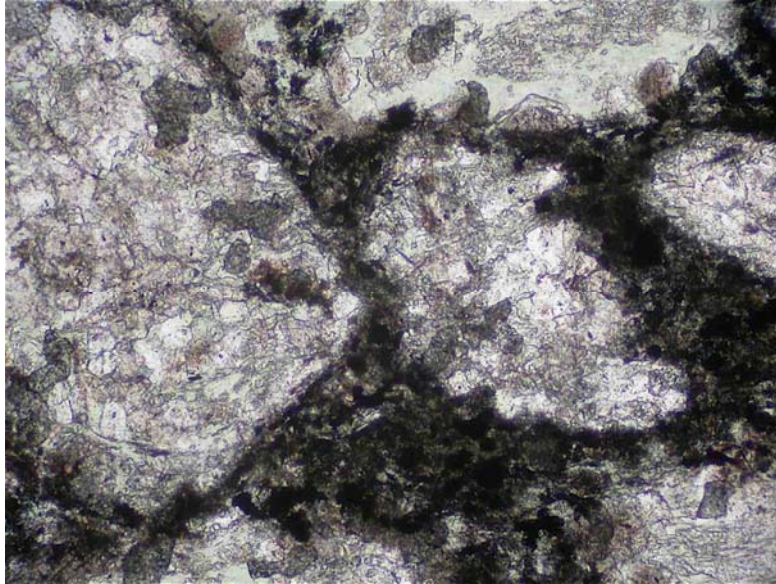
b) Alteration and structure: The original igneous rock was subject to very strong hydrothermal alteration and all former igneous minerals were replaced. Former feldspar grains were replaced by fine grained aggregates of carbonate and quartz (Fig. 1), with a little chlorite and a near colourless to pale green layer silicate mineral, probably a serpentine phase. The former ferromagnesian phenocryst phase was pseudomorphed by carbonate and chlorite (Fig. 2), with a little quartz, turbid leucoxene and trace hematite. Former FeTi oxide was replaced by leucoxene (Fig. 2). The interpreted amygdules were filled by fine to medium grained carbonate (mainly around their margins) and chlorite, with locally abundant serpentine, a little quartz and traces of pyrite and chalcopyrite. The alteration assemblage is interpreted to be of propylitic type, and it is non-foliated, overprinting the prior foliation in the host rock. A single thin (<0.1 mm) sub-planar quartz vein cuts across the altered rock.

c) Mineralisation: A trace of pyrite (rare grains up to 0.3 mm across) and chalcopyrite (<0.1 mm) occur as part of the alteration assemblage, mostly associated with amygdale sites.

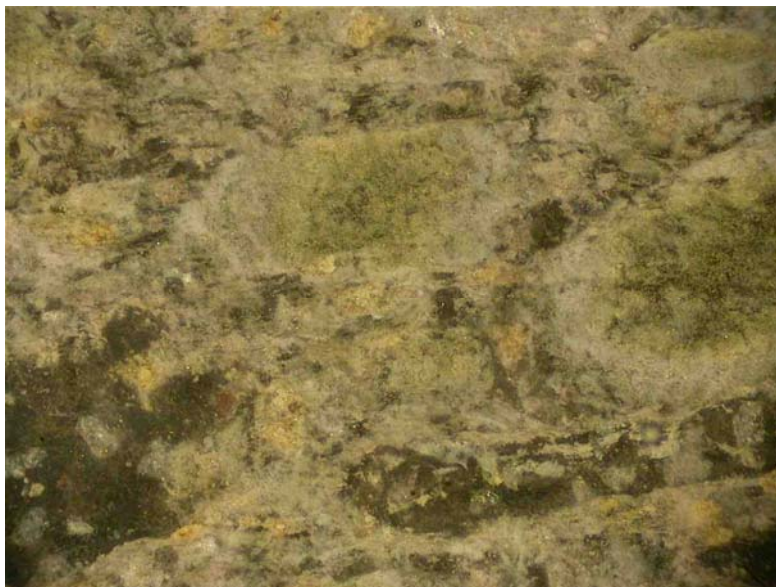
**Mineral Mode (by volume):** carbonate 50%, chlorite 30%, quartz 13%, serpentine 5%, leucoxene 2% and traces of hematite, pyrite and chalcopyrite.

**Interpretation and comment:** It is interpreted that the sample represents a very strongly hydrothermally altered porphyritic and amygdaloidal mafic igneous rock, probably of basaltic type. The original rock contained scattered phenocrysts of feldspar (e.g. plagioclase) and clinopyroxene in a fine grained, possibly flow foliated groundmass of feldspar,

ferromagnesian material and minor FeTi oxide, that also contained a few amygdules. Pervasive alteration caused complete replacement of the igneous rock and development of generally fine grained carbonate (dolomite/ankerite) and chlorite, with subordinate quartz and a serpentine mineral (the latter two mostly at former feldspar sites and in amygdules). FeTi oxide was replaced by leucoxene and there are also traces of hematite, pyrite and chalcopyrite as alteration phases. The rock was probably not of lamprophyric type, assuming that it originally contained feldspar phenocrysts.



**Fig. 1:** Pseudomorph aggregates of carbonate and minor quartz after former blocky feldspar phenocrysts, with portion of a chlorite-carbonate amygdale (top) in a dark turbid altered fine grained groundmass (dark colour caused by leucoxene). Plane polarised transmitted light, field of view 2 mm across.



**Fig. 2:** Pseudomorph aggregates of carbonate and green chlorite after former clinopyroxene in a groundmass that is pigmented whitish by fine grained leucoxene. The small pale brownish-yellow aggregates are leucoxene aggregates after former FeTi oxide grains. Plane polarised oblique reflected light, field of view 2 mm across.