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Aberfoyle Exploration Pty. Ltd.

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11th January, 1985

Mr. H.W. Fander,
Central Mineralogical Services,
39 Beulah Road,
NORWOOD. S.A. 5067

Dear Wally,

Enclosed are the two samples (270991, 270992) I mentioned to you on the phone today. I think that they represent a distal ore horizon and that the light and dark banding are a result of alternating exhalative and clastic deposition. Can this be confirmed under the microscope? If so can you please return the slides as soon as possible - I may try some electron probe microanalysis on them.

Yours faithfully,
ABERFOYLE EXPLORATION PTY. LTD.

270991 DDH H-1/93-35

270992 DDH H-1/93-9

HARTFIELD EL 15/73 TASMANIA

A. M. Hespe
A. M. HESPE,
GEOLOGIST.

Encl.

Central Mineralogical Services



39 Beulah Road
Norwood, S.A. 5067
Telephone 42 5659

Mr. A.M. Hesse
Geologist
Aberfoyle Exploration Pty. Ltd.
P.O. Box 952
BURNIE / TAS. 7320

23rd January, 1985

H-1

REPORT CMS 85/1/6

YOUR REFERENCE:	Letter dated 11.1.1985
DATE RECEIVED:	15th January, 1985
SAMPLE NOS.:	270991, 270992
SUBMITTED BY:	A.M. Hesse
WORK REQUESTED:	Petrology

Copy to:
The Chief Geologist
Aberfoyle Exploration Pty. Ltd.
144, Camberwell Road
HAWTHORN EAST / VIC. 3123

H.W. Fander, M. Sc.

DDH H-1

CENTRAL MINERALOGICAL SERVICES

Date 23rd January, 1985

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No. CMS 85/1/6 Date Received: 15.1.1985

Reference Letter dated 11.1.1985 - A.M. Hespe

Sample No. H 1 @ ^{93.35}91.3 m (270991)

Nature of Sample: D.D. Core

DESCRIPTION SECTION No. 52500

a. Hand Specimen:

Light/dark, well-banded, fine compact sediment

b. Microscopic:

This is a banded, well-indurated and incipiently metamorphosed argillaceous siltstone, in which crude slaty cleavage has developed more or less perpendicularly to the bedding/banding.

The individual bands, defined by light and dark colours, show some graded bedding, and the lighter bands tend to be coarser, with a greater amount of clastic quartz, as small angular silt-sized grains as well as occasional feldspar splinters. The lighter layers consist mainly of illite-sericite, representing recrystallized kaolinitic clays; coarser sericite has developed in subparallel streaks across the bands.

The darker bands consist mainly of pale, poorly defined chlorite, with minor illite-sericite and embedded detrital quartz and micas; dark subparallel streaks of chlorite/carbonaceous matter at right angles to the bands define a crude slaty cleavage and are aligned with the sericite streaks in the light bands. Ultrafine pyrite (?framboids) occurs throughout, but is more abundant in the dark layers.

Veinlets of hydromuscovite-carbonate-quartz-sulphide (pyrrhotite) occur at contacts between light and dark bands and elsewhere; they post-date all other features.

The incipient slaty cleavage may have developed before complete lithification.

H.W. Fander, M. Sc.

IDENTIFICATION

H 1 @ ^{93.35}91.3 m (270991)

Banded Argillaceous
Siltstone

CENTRAL MINERALOGICAL SERVICESDate 23rd January, 1985**SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)**Job No. CMS 85/1/6 Date Received: 15.1.1985Reference Letter dated 11.1.1985 - A.M. HespeSample No. H 1 @ ^{93.9}92.0 m (270992)Nature of Sample: D.D. Core**DESCRIPTION** SECTION No. 52501**a. Hand Specimen:**

Dark, finely banded or laminated fine compact sediment.

b. Microscopic:

This is an indurated and perhaps incipiently metamorphosed tuffaceous siltstone whose lithology is broadly similar to that at 91.3 m, but containing much less clay; there is also some evidence of the presence of primary volcanoclastic components, especially shards of devitrified glass.

The fine banding is more subtle, on a smaller and less obvious scale than at 91.3 m, and is mainly due to thin intercalations of carbonaceous-chloritic material in an otherwise uniform rock. This consists of splintery quartz grains (silt size), feldspar fragments, devitrified shards, clastic mica flakes, and a matrix/cement of quartz, illite and fine pale chlorite. There are irregular patches of pyrrhotite scattered through the rock, post-dating all other minerals.

A crude slaty cleavage has developed at an angle of about 45° to the bedding/banding, and the pyrrhotite patches are elongate in the same direction.

IDENTIFICATION	
H 1 @	^{93.9} 92.0 m (270992)
Tuffaceous Siltstone	

H.W. Fander, M. Sc.

DDH H-1
Split Core Sample

ANALABS

A division of MacDonald Hamilton & Co. Pty. Ltd.

Herfield ⑦

ANALYTICAL DATA

SAMPLE PREFIX REPORT NUMBER REPORT DATE CLIENT ORDER No. PAGE

23.3 08 2901 6.3.85 8904 1 OF 2

TUBE No.	SAMPLE No.	Depth	Cu	Pb	Zn	Ag	As	Ba	Cr	
1	355014	93.35 m	10	10	70	X	X	2760	65	
2	355015	93.9 m	15	15	50	0.5	19	2700	150	
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Results in ppm unless otherwise specified
T = element present; but concentration too low to measure
X = element concentration is below detection limit
— = element not determined

AUTHORISED OFFICER 

Aberfoyle Resources Limited

Incorporated in Victoria

EXPLORATION DIVISION

ABERFOYLE RESOURCES LIMITED

EXPLORATION DIVISION

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13 November, 1990

Dr. A. J. Crawford,
University of Tasmania,
Department of Geology,
G.P.O. Box 252C,
HOBART. TAS. 7001

Tony,

Please find enclosed a suite of seven samples from DDH HAT-1 and HAT-2 drilled on our Mackintosh E.L. Locations and logged descriptions are attached. Both holes have penetrated Que River shale and underlying andesitic to basaltic lithologies. Geochemically the andesites in both these holes fall on the boundary of andesite and dacite. I will be analysing these samples in the near future and will forward these if you think they will assist. Please prepare thin sections and describe these samples, retaining off cuts to be returned with the sections.

Yours faithfully,


A. W. McNeill,
GEOLOGIST.

ATTACHMENT

DDH HAT 1

563785	65.2m	Hellyer basalt equivalent
563786	91.75m	Hellyer basalt equivalent
563787	97.5m	andesite lava
563788	134.85m	?Dacite lava

DDH HAT-2

563789	133.45m	?basalt lava
563790	142.75m	andesite lava
563791	156.5m	andesite lava

PETROGRAPHIC REPORT

(Rocks from DDH HAT-1 and 2)

for

ABERFOYLE RESOURCES Ltd
(attn. Andrew McNeill)

by

Anthony J. Crawford
Geology Department
University of Tasmania

22/11/90

SAMPLE NUMBER: 563785 HAT-1, 62.5m

SUMMARY:

This is a strongly carbonate-altered, Hellyer-type, formerly cpx+olivine-phyric basaltic lava with distinctive quartz xenocrysts and not uncommon hematite-altered, disseminated and fine-grained pyrite.

THIN SECTION DESCRIPTION:

This sample is a massive, thoroughly carbonate-altered porphyritic basaltic lava. Major phenocryst phases were clinopyroxene and olivine, but both phases have been totally replaced by calcite. Due to the strong calcite overprint, it is difficult to estimate accurately the relative abundances of clinopyroxene and olivine, although I am certain olivine was subordinate. Mainly euhedral clinopyroxene phenocrysts probably made up around 10 modal% of this rock, whereas olivine phenocrysts made up less than 5 modal%. Both phases are rarely larger than 1mm long, although some definite former cpx phenocrysts reach 2mm long; phenocrysts grade in size through microphenocrysts to groundmass crystals. Some former cpx and olivine phenocrysts have clusters of hematite(?) euhedral and subhedral crystals growing in the replacing calcite. In this section, there are at least five quite large (to 2mm across) xenocrysts of quartz that have been strongly reacted around the margins and fractured internally. Calcite is even overprinting these quartz xenocrysts, which appear to be monocrystalline volcanic quartz rather than polycrystalline pelitic metamorphic grains. Well-preserved small chromite euhedra occur in some altered olivine crystals.

The groundmass of this sample was quite crystalline relative to many of the quenched Hellyer basalts, implying derivation from within a reasonably thick flow unit or dyke. The groundmass is extensively altered and recrystallized, but was clearly made up of abundant stubby prisms of augite, and almost certainly quite abundant longer prisms of plagioclase. Both are totally replaced by calcite, and interstitial material (altered glass?) has recrystallized to a messy aggregate of quartz, chlorite and patchy fine-grained hematite. Small disseminated cubes of hematite-altered pyrite are relatively common.

I have no doubt that this sample is a Hellyer basalt. It has suffered considerably stronger hydrothermal alteration, dominated by carbonate-pyrite (hematite) alteration, than many Hellyer basalts I have seen. The presence of quartz xenocrysts draws comparison with basalts from Sock Ck Sth and MAC-27 (eg 563714).

SAMPLE NUMBER: 563786 HAT-1, 91.75m

SUMMARY:

This is a less-altered and more primitive basalt than the previous sample, with subequal amount of altered olivine and fresh augite phenocrysts, and quartz xenocrysts, in a quenched groundmass.

THIN SECTION DESCRIPTION:

This is a better preserved olivine+augite-phyric basaltic lava with clear affinities to typical Hellyer basalts. It contains a few large (to 4mm long) oval vesicles filled by calcite, but consists of almost equal amounts (10-12 modal% each) of perfectly fresh euhedral clinopyroxene phenocrysts usually less than 1mm long, and larger, altered olivine phenocrysts that reach 3mm long set in a quenched groundmass. Olivine phenocrysts have been replaced in almost every case by a zoned assemblage composed of olive chlorite in the core and extremely fine-grained quartz mosaics around the outer third to two-thirds of each crystal; these are not uncommonly partially overprinted by calcite. Small chromite euhedra are not uncommon in the altered olivines. As in the previous sample, cpx grades in size from phenocrysts through microphenocrysts to stubby groundmass prisms. Also as in the previous rock, this basalt contains five or six quartz xenocrysts to a few mm across, that show pronounced reaction rims composed of very fine-grained clinopyroxene.

The groundmass of this basalt was finer-grained than that of the previous sample, and probably consisted mainly of glass charged with feathery aggregates and sheaves of quenched plagioclase and augite. Glass has altered to very fine-grained secondary quartz and intimately-intergrown dull green chlorite, with minor spotting by calcite.

As for the previous sample, this is unambiguously a Hellyer-type quite primitive basalt, that shows the same unusual quartz xenocrysts discussed under 563785. It may be a valuable exercise to test whether these rocks with quartz xenocrysts are from a single eruptive unit, or whether they are more widespread within the thick pile of Hellyer basalts. I interpret the xenocrysts to mean that basalt pumped into a magma chamber in which quartz-phyric rhyolite was sitting. The only evidence of such magma mixing, if the volume of basalt exceeded the rhyolite, would be reacted quartz phenocrysts.

SAMPLE NUMBER: 56378 HAT-1, 97.5m

SUMMARY:

This is a polymict lava breccia dominated by formerly glassy evolved andesite and dacite fragments. Given that diagnosis, it contains a surprising amount of sphene as an alteration product, which may reflect a largely andesitic precursor.

THIN SECTION DESCRIPTION:

This is an polymict lava breccia composed dominantly of andesitic to dacitic lava fragments, mainly less than 1cm across. They are invariably plagioclase-phyric, whereas some also contain euhedral phenocrysts of altered cpx, and others a few reacted phenocrysts of quartz. Groundmass textures are considerably more variable than would be able to be produced during explosive eruption of a single flow unit. Many of the larger, dark-coloured fragments are probably from a single unit, being sparsely plagioclase+augite-phyric evolved andesite or dacite, with formerly glassy groundmass that has devitrified to a variable fine- to medium-grained mosaic texture dominated by quartz and albite. In all fragments, plagioclase, which is almost always rather elongate prisms, is totally sericitized, as are the subordinate former augite phenocrysts. A few distinct sugary-textured rhyolite fragments are present, with reacted small quartz phenocrysts. Some more chloritic fragments had microlitic cpx throughout the altered groundmass, and were almost certainly andesitic.

The alteration of this sample is patchy and variable, reflecting the original inhomogeneity in texture and fragment composition. Although sericite is by far the most abundant alteration phase, chlorite is also present (but not common), and brownish, highly birefringent and rather amorphous sphene is quite abundant, often occurring with hematite, but clearly not occupying sites of former FeTi oxides. Sphene and hematite often form trails and concentrations along fragment margins. Since TiO₂ abundances in Mount Read Volcanics are fairly strongly inversely correlated with SiO₂ contents of lavas, the abundant secondary sphene may indicate a more andesitic precursor than the andesite-to-dacite suggested on purely petrographic grounds.

This sample is probably a lava breccia produced by explosive submarine eruption of a rather evolved andesitic magma, that mixed into the breccia odd fragments of other rocks occurring in the vicinity. I don't believe that it has been reworked. I wonder whether the chemistry will be very informative; presumably it will give some hybrid numbers between dacite and andesite.

SAMPLE NUMBER: 563788 HAT-1, 134.85m

SUMMARY:

This is a plagioclase+sparsely augite-phyric glassy andesite lava that has been finely fractured and brecciated during eruption.

THIN SECTION DESCRIPTION:

This is a mottled grey-green massive dacitic lava with diffuse segregations of quartz. It shows in thin section a beautiful microjig-saw fit texture produced by in situ fracturing of what was a dacitic to andesitic lava. The rock was largely glassy, consisting of about 5 modal % of quite euhedral and often elongate plagioclase phenocrysts mainly less than 0.6mm long, and much less abundant, but not uncommon small augite phenocrysts partially altered to epidote. Plagioclase phenocrysts have been albitized, and contain variable amounts of yellow epidote and some dirty sericite. Former FeTi oxide microphenocrysts are also not uncommon, and are altered to rims of hematite enclosing cores composed of leucoxenitic aggregates.

The distinctive texture of this lava is primary, not the result of hydroblasting or 'false brecciation'. Jig-saw fit small fragments are composed of almost opaque, brownish devitrified glass, and are separated one from the other by an anastomosing network of "fractures" that have been filled by the same magma, which in the fractures cooled rather more slowly, forming a more crystalline (albeit extremely fine-grained) material containing abundant aligned plagioclase microlites. Patches of secondary quartz more than 1cm long are present, and sometimes contain epidote inclusions, and narrow cross-cutting quartz-calcite veinlets sometimes contain tiny pyrite euhedra.

The not uncommon augite, common epidote in the alteration assemblage, and rather elongate plagioclases, all suggest to me that this is an andesitic lava rather than a dacite, although in hand specimen, the rock is rather pale compared with other Hellyer region andesites I have seen. It is quite reminiscent of the glassy silicic andesites recorded and described from MAC-10 (eg. 396710, 11 and 12).

SAMPLE NUMBER: 563789 HAT-3, 133.45m

SUMMARY:

This is an intensely sericite-pyrite (+hematite?)-altered strongly plagioclase+augite-phyric basaltic to andesitic lava.

THIN SECTION DESCRIPTION:

This is a rather paler grey, speckled and strongly altered basaltic lava in which much of the original texture, and all of the primary mineralogy has been obliterated. It is clear that the rock was phenocryst-rich, although the identity of the former phenocrysts is rather difficult to ascertain. Phenocrysts range up to 2mm long, and are totally replaced by fine-grained sericite, although far from the majority (a large minority?) of them have shapes suggestive of plagioclase precursors. Many were probably augite. No clear former olivine phenocrysts could be identified.

The groundmass of this rock was probably vitrophyric, but it has been thoroughly replaced by fine-grained sericite and very fine-grained quartz riddled with tiny to 0.4mm-sized altered(?) pyrite clusters and trails of grains and possibly abundant very fine-grained hematite.

This rock was probably a strongly plagioclase+augite-phyric andesite to basalt lava. It has suffered severe sericite-pyrite (hematite) alteration.

SAMPLE NUMBER: 563790 and 563791 HAT-2, 142.75 and 156.5m

SUMMARY:

These are both very similar plagioclase+sparsely augite-phyric andesitic lavas that suffered an intense early sericite-pyrite (hematite or magnetite?) alteration event, then a silica alteration episode that produced a false brecciation texture, followed by diffuse carbonate alteration.

THIN SECTION DESCRIPTION:

These are texturally fairly well-preserved plagioclase-phyric andesitic lavas that show in both the core slices and thin section, abundant evidence for false brecciation associated with silicification of the rock. Where best preserved, both are seen to be composed of around 5-8 modal% of totally sericitized plagioclase phenocrysts, mostly less than 1mm long. Very few altered phenocrysts have shapes suggestive of mafic precursors, although a few small chlorite euhedra may have been augite. Small FeTi oxide microphenocrysts are replaced fine-grained aggregates of hematite or magnetite and leucoxene.

The groundmass of both rocks was vitrophyric, in 790 with abundant plagioclase microlites set in subordinate glass that has been thoroughly replaced by sericite, fine, granular magnetite or hematite (after pyrite in places?), and some spotty secondary quartz, and in 791 an originally more glassy groundmass that is now composed of almost opaque devitrified glass. Sample 790 is crosscut by angular fracture fillings and coarse vein networks of very fine-grained, almost chalcedonic secondary silica, that have produced the false brecciation texture so evident in the hand specimen. In places, and more typically in 791, the silica alteration has soaked from the veins into the groundmass of the rock, creating a coarse-grained polygonal silica-rich groundmass. The silicification has been overprinted by diffuse calcite alteration, but the common, disseminated opaques are clearly related to the early sericite alteration event and not the silica- or carbonate alteration.