National Argon Map: an AuScope Initiative
$^{40}Ar/^{39}Ar$ Geochronology Laboratory Sample Submission Form

This form must be completed and returned to Marnie Forster (Marnie.Forster@anu.edu.au) before any work can be commenced in the Argon Laboratories.

Person submitting samples: Nick Roberts
Affiliation: Mineral Resources Tasmania
Project Title: Mid-Cenozoic chronostratigraphy of central and northern Tasmania
Sample Number(s) (including IGSN if one exists): A501607 (MRT Reg. No.)
Mineral separation required? Yes or No: No
Date submitted: 20/07/2021

GEOGRAPHIC AREA/ PROVINCE/ BASIN: Central Plateau, Tasmania	
1:250k SHEET NAME: Geology of SW Tasmania (2011)	**NUMBER:** SK55-5 Queenstown (old series)
1:25k SHEET NAME: Tarraleah (not published)	**NUMBER:** 4431
LOCATION METHOD: (GPS: GDA94), as reported by Entura	
ZONE: 55	
EASTING: 454015	**NORTHING:** 5316623
LATITUDE: 42°18'4"S	**LONGITUDE:** 146°26'31"E

STRATIGRAPHIC UNIT FORMAL NAME *:
STRATIGRAPHIC UNIT INFORMAL NAME: Tertiary basalt
LITHOLOGY: Basalt

DRILLHOLE ID (if applicable): TA06DC013 (MRT ID 84617)
PROSPECT (if applicable):
DEPTH FROM (metres): 108.1
DEPTH TO (metres): 108.1

* Stratigraphic Unit names can be searched and checked within the Australian Stratigraphic Units Database via the following link: https://asud.ga.gov.au/

Dating Objective

What is the geological question $^{40}Ar/^{39}Ar$ analysis will address?

Provide age constraint on the base of a ~110-m-thick, mid-Cenozoic, basalt stack that underlies the southern margin of Tasmania's Central Plateau at Tarraleah. This will constrain the onset of voluminous mid-Cenozoic effusive volcanism in the southern part of Tasmania's Central Plateau and ensuing long flows and aquagene volcaniclastics in the upper Derwent Valley (Sutherland, 1980).

What type of age(s) are expected? (e.g. magmatic crystallisation, metamorphism, fluid alteration/mineralisation, cooling, shearing etc):

Cooling/emplacement ages of an individual basalt flow at the base of the ~110-m-thick basalt stack.

Mineral target(s) for dating:

Groundmass.

Estimated $^{40}Ar/^{39}Ar$ age (e.g. Cenozoic, Mesozoic, Paleozoic, Proterozoic, Archean – provide estimated numerical age range if possible):

Cenozoic. Based on ^{40}K-^{40}Ar and $^{40}Ar/^{39}Ar$ ages of other Tertiary basalt-flow sequences in this part of Tasmania, the age is likely to be between ca. 40 and 20 Ma.

Sample Information

Location description (e.g. a sample of x was collected from y, z km from abc town):

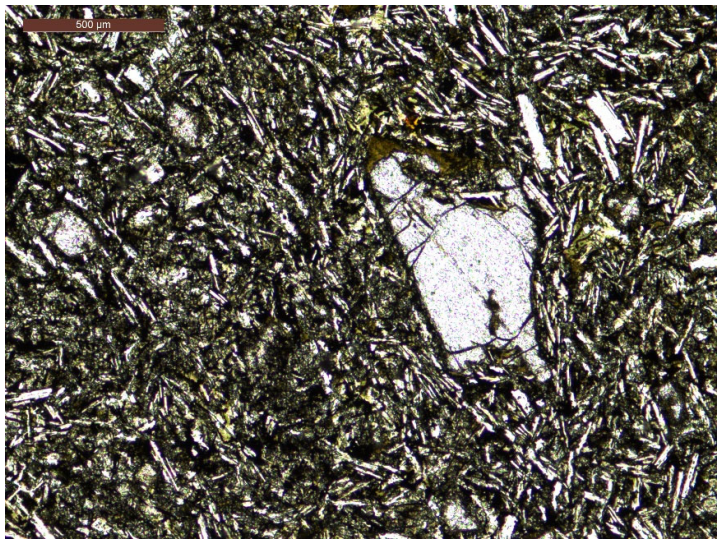
This drillhole is located on the plateau surface west of Nive River, 500 m west of Tarraleah. The sample is from a depth of 108.1 m, which is ~107 m below the top of the basalt stack and ~4 m above the base of the basalt stack.

Lithological characteristics (rock description):
Porphyritic basalt, likely olivine tholeiite (geochemistry pending).

Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):
No age constraints are yet available for this location, although a sample from the mudstone beneath the lowest basalt has been submitted for palynological analysis. The 110-m-thick stack of basalts is overlain by ~1 m of gravel and underlain by ~1 m of siltstone and sandstone that in turn rest on Jurassic Dolerite. This sample should be older than sample A501603 (also submitted in this batch), which is from ~101 m higher in the same drillhole.

Thin section description (if available):
This is a porphyritic basalt with a fine-grained, locally fluidal, intersertal/ intergranular groundmass.
Abundant olivine phenocrysts (≤ 1.5mm) are strongly embayed to skeletal. Sparse clinopyroxene phenocrysts (≤ 1mm) may be isolated, or more commonly occur as glomerocysts (≤ 1.5 mm across) of several grains. Plagioclase microphenocrysts (≤ 600 um long) grade into the groundmass. There is a single ± equant subhedral xenocryst (~1 mm across) of coarsely twinned plagioclase, mottled with numerous small dark (melt?) inclusions, but with a narrow clearer rim.
The groundmass consists of plagioclase laths (typically ~100 – 200um), locally aligned but in many parts randomly orientated, small (~10 -30 um) clinopyroxene granules, and a mesostasis of very fine-grained opaque blebs and needles. Green-brown alteration products occur at the rims of some olivine phenocrysts and as diffuse patches in some parts of the groundmass. Similar material may line sparse round vesicles (~1-2 mm across).
An elongate xenolith of fine-grained (~200um) quartz sandstone is surrounded by a reaction corona of finely acicular (?)clinopyroxene.

Photograph(s) e.g. field site, hand-specimen, photomicrograph:
These and additional photomicrographs have been provided to laboratory staff at Curtin University.



A501607_Tarraleah_x5_PPL

A501607_Tarraleah_x5_XN

Relevant bibliographic references:

Sutherland F.L. 1980. Aquagene volcanism in the Tasmanian Tertiary, in relation to coastal seas and river systems. Papers and Proceedings of the Royal Society of Tasmania 114: 177-199.