

# National Argon Map: an AuScope Initiative

## $^{40}\text{Ar}/^{39}\text{Ar}$ Geochronology Laboratory Sample Submission Form

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

<b>Person submitting samples:</b> Nick Roberts
<b>Affiliation:</b> Mineral Resources Tasmania
<b>Project Title:</b> Mid-Cenozoic chronostratigraphy of central and northern Tasmania
<b>Sample Number(s) (including IGSN if one exists):</b> A501603 (MRT Reg. No.)
<b>Mineral separation required? Yes or No:</b> No
<b>Date submitted:</b> 20/07/2021

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

<b>STRATIGRAPHIC UNIT FORMAL NAME *:</b>
<b>STRATIGRAPHIC UNIT INFORMAL NAME:</b> Tertiary basalt
<b>LITHOLOGY:</b> Basalt

<b>DRILLHOLE ID (if applicable):</b> TA06DC013 (MRT ID 84617)
<b>PROSPECT (if applicable):</b>
<b>DEPTH FROM (metres):</b> 6.65
<b>DEPTH TO (metres):</b> 6.65

\* 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 $^{40}\text{Ar}/^{39}\text{Ar}$ analysis will address?**

Provide age constraint on the top 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 termination of mid-Cenozoic effusive volcanism in the southern part of Tasmania's Central Plateau and related flows 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 top of the ~110-m-thick basalt stack.

#### **Mineral target(s) for dating:**

Groundmass.

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

Cenozoic. The nearest similar dated basalts, 40 km to the NNE at Great Lake, are ~24-22 Ma (Sutherland and Hale, 1970). Based on this and other  $^{40}\text{K}$ - $^{40}\text{Ar}$  and  $^{40}\text{Ar}/^{39}\text{Ar}$  ages of other Tertiary basalt-flow sequences in 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 6.65 m, which is ~5 m below the top of the basalt stack and ~106 m above the base of the basalt stack.

**Lithological characteristics (rock description):**

Basalt, likely olivine tholeiite (geochemistry pending).

**Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):**

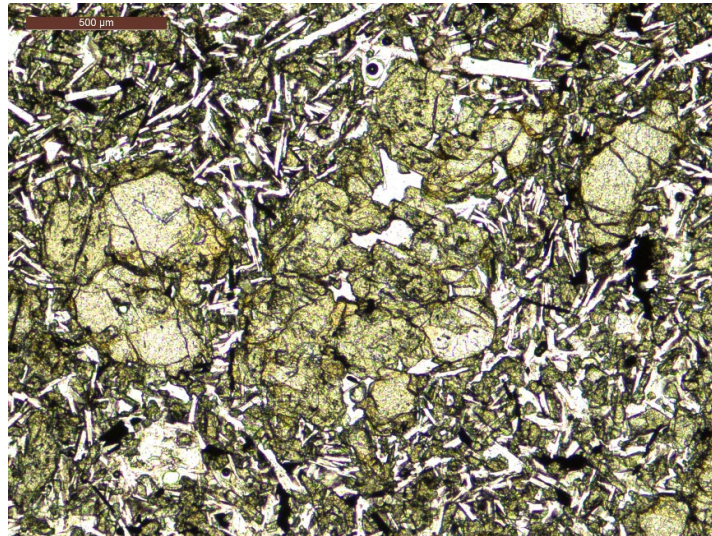
No age constraints are yet available for this location, although a sample from the mudstone beneath the lowest basalt has been submitted for palynological analysis. The 110-m-thick stack of basalts is overlain by ~1 m of gravel and underlain by ~1 m of siltstone and sandstone that in turn rest on Jurassic Dolerite. This sample should be younger than sample A501607 (also submitted in this batch), which is from ~101 m lower in the same drillhole.

**Thin section description (if available):**

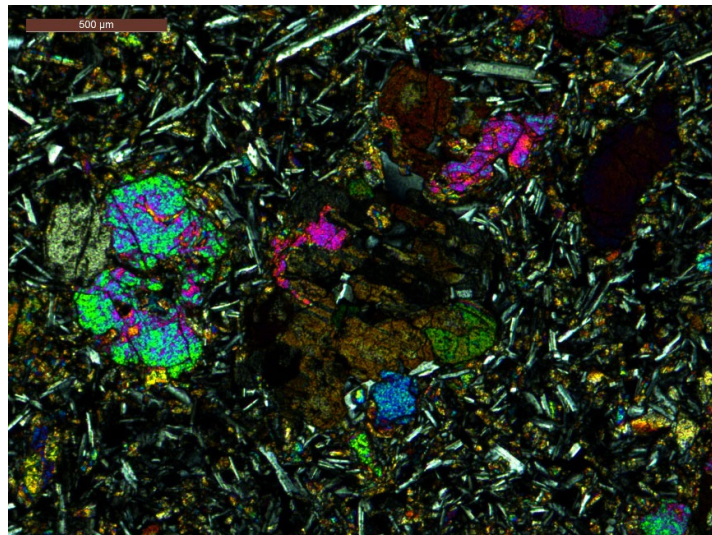
Numerous subhedral, slightly to strongly embayed olivine phenocrysts ( $\leq 1.5$  mm). Sparse, mostly smaller ( $\sim 0.5 - 1$  mm) clinopyroxene phenocrysts, often grouped in glomerocrysts. Sparse microphenocrysts of plagioclase ( $\leq 1$  mm long  $\times$  150  $\mu$ m across), grading down to a fine-grained intergranular groundmass of unoriented plagioclase laths (typically 100 – 200  $\mu$ m long), clinopyroxene granules (typically  $\sim 50$   $\mu$ m across) and irregularly polygonal to elongates ( $\leq 200$   $\mu$ m) grains. Scattered rounded to somewhat irregular voids (0.5 – 1 mm across). Alteration limited to very slight discoloration of some olivine rims.

**Photograph(s) e.g. field site, hand-specimen, photomicrograph:**

These and additional photomicrographs have been provided to laboratory staff at Curtin University.



A501603\_2\_Tarraleah\_x5\_PPL



A501603\_2\_Tarraleah\_x5\_XN

**Relevant bibliographic references:**

Sutherland, F.L., Hale, G.E.A. 1970. Cenozoic volcanism in and around Great Lake, central Tasmania. *Papers and Proceedings of the Royal Society of Tasmania* 104: 17-32.

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.