

# 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> A501207 (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> NW Tasmania	
<b>1:250k SHEET NAME:</b> Geology of NW Tasmania (2020)	<b>NUMBER:</b> SK55-3 Burnie (old series)
<b>1:25k SHEET NAME:</b> Guildford	<b>NUMBER:</b> 3841
<b>LOCATION METHOD:</b> Drillhole collar survey (1987) converted to GDA94 coordinates	
<b>ZONE:</b> 55	
<b>EASTING:</b> 392006	<b>NORTHING:</b> 5410390
<b>LATITUDE:</b> 41°27'3"S	<b>LONGITUDE:</b> 145°42'25"E

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

<b>DRILLHOLE ID (if applicable):</b> SBDP4 (MRT ID 13520)
<b>PROSPECT (if applicable):</b>
<b>DEPTH FROM (metres):</b> 364.4
<b>DEPTH TO (metres):</b> 365.5

\* 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 a thick, mid-Cenozoic, basalt stack with several thin zones of continental sediments that underlies part of the >750-km<sup>2</sup> basalt plateau near Waratah in northwestern Tasmania. The stratigraphy is penetrated by ten holes drilled in the mid-1980s during MRT's Sub-Basalt Drill Project (SBDP). The age of this sample (from near the base of 375-m basalt sequence) will improve upon existing palynostratigraphy for the SBDP holes and limited magnetostratigraphy from nearby hole SBDP5. This includes constraining the onset of mid-Cenozoic effusive volcanism in the Waratah area.

**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 ~375-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. Based on  $^{40}\text{K}$ - $^{40}\text{Ar}$  and  $^{40}\text{Ar}/^{39}\text{Ar}$  ages of other Tertiary basalt-flow sequences in this part of Tasmania, the age is likely to be between ca. 40 and 20 Ma. Palynostratigraphic constraints from thin sediment zones in this hole (Baillie, 1987) and in several nearby SBDP holes penetrating similar basalt stacks (Seymour, 1989) narrow the expected age range to latest Eocene to early Oligocene.

## Sample Information

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

This drillhole is located 14.5 km due east of Waratah, Tasmania. The sample is from 364.4-365.5 m depth, 10 m above the base of the basalt sequence, 18 m above basement rock (Devonian Florence Formation), and 47 m above the end of the hole.

### **Lithological characteristics (rock description):**

Olivine tholeiite.

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

This sample is from one of the lowest basalt flows in a ~375-m-thick flow stack. A thin zone of Tertiary sediments 10 m below the sample contains pollen/spores of latest Eocene to earliest Oligocene age. Pollen/spores from another thin sediment zone 165 m above the sample are of early Oligocene age (Seymour, 1989).

Based on stratigraphic relationships, the present sample should be older than A500731 (sample of one of lowest basalts in SBDP5) and substantially older than R000538 (a surface sample from near SBDP5 that likely correlates with one of the highest basalt flows in that core). Both A500731 and R000538 are included in this batch of submitted samples. SBDP5 is only 5.4 km farther to the northwest.

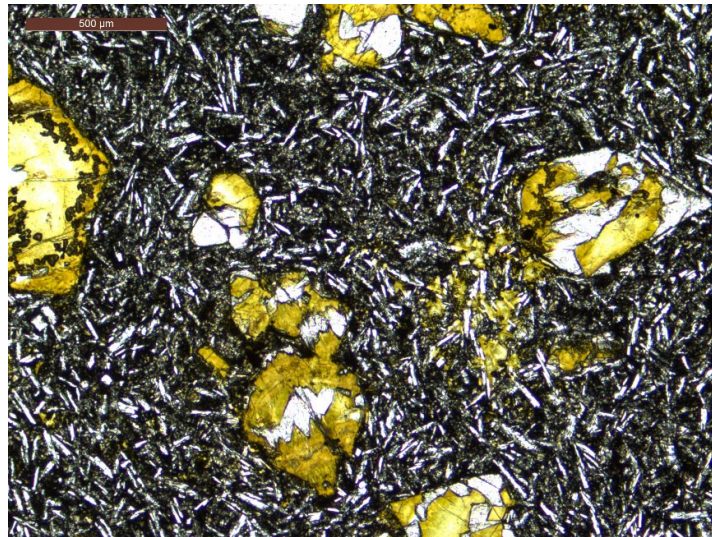
### **Thin section description (if available):**

This porphyritic basalt consists of partly altered olivine phenocrysts ( $\leq 1$  mm) in a fine-grained intersertal/intergranular groundmass of plagioclase laths (~50 – 150  $\mu$ m), minute interstitial clinopyroxene granules and a black turbid mesostasis rich in tiny scaly opaque grains.

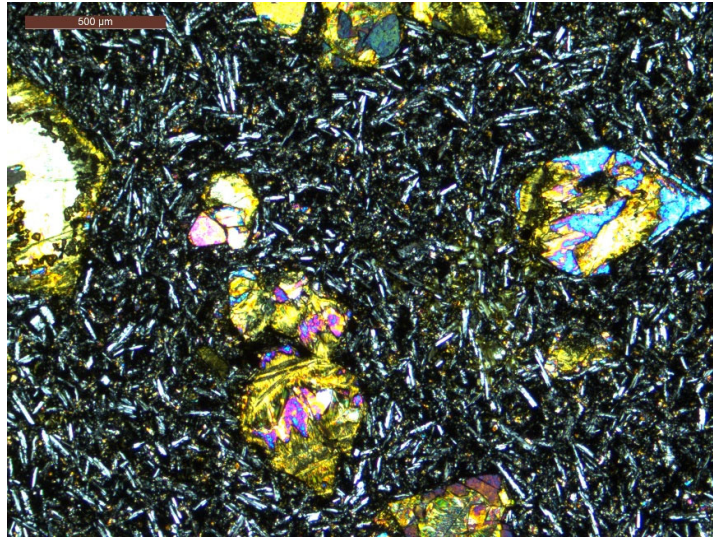
Olivine is ~75% altered to khaki-brown fibrous "iddingsite", with diffuse patches of similar material in groundmass. Small (200 – 400  $\mu$ m) round amygdales are filled with fibrous radiating (?)anthophyllite.

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

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



A501207\_SBDP4-364m\_x5\_PPL



A501207\_SBDP4-364m\_x5\_XN

**Relevant bibliographic references:**

Baillie, P.W. 1987. *Sub-basalt Drilling Project Hole 4*. UR1987/61. 14 pp.

Seymour, D.B. 1989. *Geological atlas 1:50 000 series. Sheet 36 (8015N). St Valentines. Geological Survey Explanatory Report, Tasmania Department of Mines*. ER80155 147 pp.