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): A500737 (MRT Reg. No.)
Mineral separation required? Yes or No: No
Date submitted: 20/07/2021

GEOGRAPHIC AREA/ PROVINCE/ BASIN: Central/NWTasmania	
1:250k SHEET NAME: Geology of NW Tasmania (2020)	**NUMBER:** SK55-3 Burnie (old series)
1:25k SHEET NAME: Liena	**NUMBER:** 4239
LOCATION METHOD: (estimated from Hydro-Electric Commission of Tasmania files: GDA94)	
ZONE: 55	
EASTING: 431782	**NORTHING:** 5392413
LATITUDE: 41°37'7"S	**LONGITUDE:** 146°10'47"E

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

DRILLHOLE ID (if applicable): HEC-5831 (MRT ID 15592)
PROSPECT (if applicable):
DEPTH FROM (metres): 53.7 (176 feet 1 inch)
DEPTH TO (metres): 54.0 (177 feet 3 inches)

* 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 ~70-m-thick, mid-Cenozoic, basalt stack that underlies Tasmania's Central Plateau near Lemonthyme Power Station. This sample also provides the basis for a broad age comparison between the flow sequence underlying Emu Plain and basalt clasts incorporated into a diamictite (Lemonthyme Tillite) penetrated by drillhole lower on the slope near the valley bottom.

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 ~70-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. Preliminary palynological results for core samples of silts from 12 and 28 m deeper in the hole indicate a maximum age of early Oligocene.

Sample Information

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

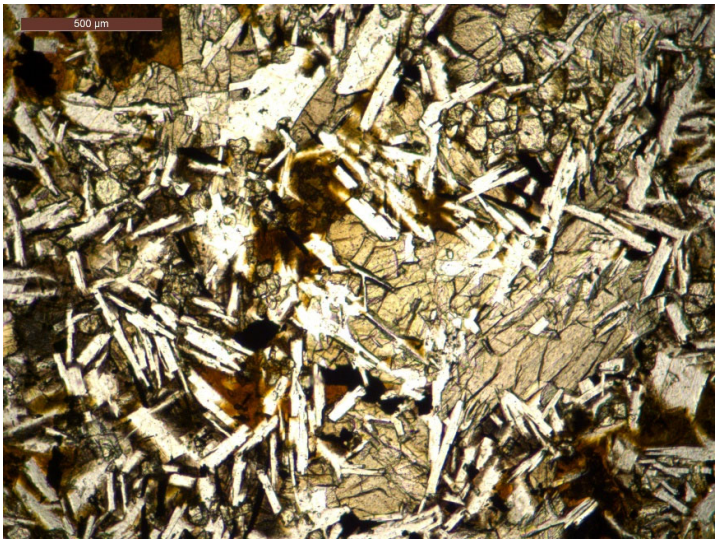
This drillhole is located on the southwest margin of Emu Plains, ~3.7 km east-southeast of Lemonthyme Power Station.

Lithological characteristics (rock description):
Basalt, probably tholeiitic (geochemistry pending).

Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):
The 70-m-thick stack of basalts is overlain by ~10 m of basalt-derived clay and it is underlain by ~20 m of silt that rests unconformably on Cambrian-age Dove Group basement rock. Few age constraints are yet available for this sequence or nearby exposures of the units underlying Emu Plains. Two samples of fine-grained sediments from below the basalt stack (12 and 28 m below this sample) that were recently submitted for palynological analysis suggest a maximum early-Oligocene age for the sub-basalt sediment sequence.
Two other basalt samples submitted in the same batch may be of comparable age. Both are basalt clasts from a diamictite unit directly down slope (~3.6 km to the west-northwest) of this part of Emu Plains that is known only from boreholes. Those clasts (sample R003680 [drillhole HEC-5808] and sample R003682 [drillhole HEC-5833]) may have been derived from the basalt stack at Emu Plains or a nearby stack of similar age, and thus may yield similar ages to this sample.

Thin section description (if available):
Sparse olivine phenocrysts (≤2 mm) are largely replaced by "iddingsite" with rare fresh cores. The ophitic to subophitic groundmass consists of plagioclase laths (≤ 500 um long), partly enclosed by clinopyroxene platelets (~500 um – 1mm across), together with angular/irregular to elongate/acicular opaques and much orange-brown alteration.

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



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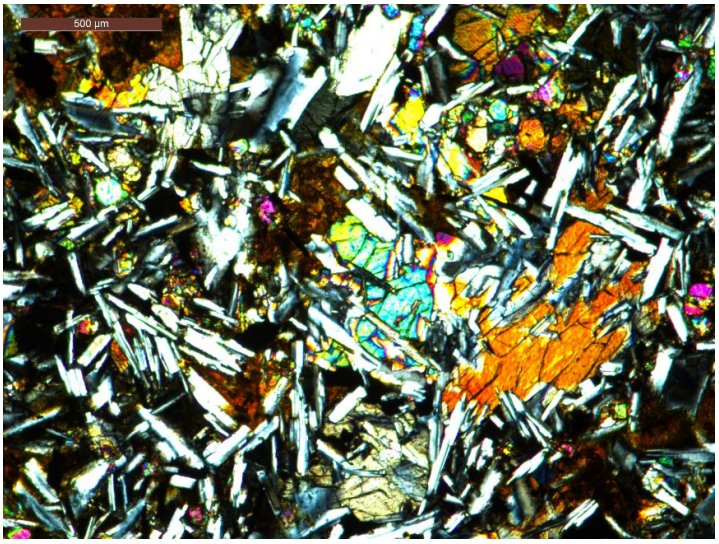

A500737_Emu_Plains2_x5_XN

Relevant bibliographic references:
None.