

National Argon Map: an AuScope Initiative

⁴⁰Ar/³⁹Ar 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: Ian T Graham
Affiliation: UNSW Sydney
Project Title: Age of basaltic intrusions within the Sydney Basin, NSW
Sample Number(s) (including IGSN if one exists): 3522-20.29
Mineral separation required? Yes or No: Yes
Date submitted:

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Sydney Basin	
1:250k SHEET NAME: Newcastle	NUMBER: SI/56-2
1:100k SHEET NAME:	NUMBER:
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94)	
ZONE: 56 H	
EASTING: 345061	NORTHING: 6384607
LATITUDE: -32.665335564	LONGITUDE: 151.347711694

STRATIGRAPHIC UNIT FORMAL NAME *: Branxton Formation
STRATIGRAPHIC UNIT INFORMAL NAME:
LITHOLOGY: Doleritic dyke

DRILLHOLE ID (if applicable): 3522
PROSPECT (if applicable): Hunter Expressway Geotechnical hole
DEPTH FROM (metres): 22.29
DEPTH TO (metres): 22.39

* 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 ⁴⁰Ar/³⁹Ar analysis will address?

The magmatic age of crystallisation of the dolerite sill and how this relates to other dated dykes/sills within the Sydney Basin.

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

Magmatic crystallisation

Mineral target(s) for dating:

Plagioclase separate.

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

The sill intrudes the Middle Permian Branxton Formation and is likely to be from Jurassic to Cenozoic in age.

Sample Information

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

The drillcore was drilled near the township of Branxton. **Lithological characteristics (rock description):**

A medium-grained massive and undeformed dolerite.

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

Doleritic dyke intrudes the Middle Permian Branxton Formation

Thin section description (if available):

Sample is currently being thin-sectioned.

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

Relevant bibliographic references:

Johnson, R.W., Knutson, J., and Taylor, S.R. (eds) (1989). *Intraplate volcanism in eastern Australia and New Zealand*. Cambridge University press.

Och, D.J., Offler, R., Zwingmann, H., Braybrooke, J. and Graham, I.T., 2009. Timing of brittle faulting and thermal events, Sydney region: association with the early stages of extension of East Gondwana. *Australian Journal of Earth Sciences*, 56(7), pp. 873-887.

Offler, R., Zwingmann, H., Foden, J., Sutherland, F.L., and Graham, I.T., 2019. Age and composition of dykes emplaced before and during the opening of the Tasman Sea – source implications. *Australian Journal of Earth Sciences* 66 (8): 1129-1144.

Rickwood, P. C. (1985). Igneous intrusives in the Greater Sydney Region. In P. J. N. Pells (Ed.), *Engineering geology of the Sydney Basin* (pp. 215–307). Rotterdam, Netherlands: Balkema

Wellman, P., and McDougall, I., 1974a. Cainozoic igneous activity in eastern Australia. *Tectonophysics* 23: 49-65.

Wellman, P., and McDougall, I., 1974b. Potassium-argon ages on the Cainozoic volcanic rocks of New South Wales. *Journal of the Geological Society of Australia*, 21: 247-272.