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: Ian Terence Graham
Affiliation: UNSW Sydney
Project Title: Age of mineralisation within the Drake Goldfield
Sample Number(s) (including IGSN if one exists): WCDD003 - 382.3
Mineral separation required? Yes
Date submitted:

GEOGRAPHIC AREA/ PROVINCE/ BASIN : New England Orogen, Drake Volcanics	
1:250k SHEET NAME: Grafton 1:250k Geological Map	**NUMBER:** 188
1:100k SHEET NAME: Drake 1:100k Geological Map	**NUMBER:** 94
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94) WGS84	
ZONE: 56J	
EASTING: 436966.00 m E	**NORTHING:** 6801463.00 m S
LATITUDE: 28° 54.790'S	**LONGITUDE 152° 21.203'E**

STRATIGRAPHIC UNIT FORMAL NAME *: Drake Volcanics
STRATIGRAPHIC UNIT INFORMAL NAME: Drake Volcanics
LITHOLOGY: Complexly interbedded rhyodacitic to andesitic flows, tuffs, breccias and volcanolithic sediments; including porphyritic lava, rhyolitic to andesitic crystal-lithic tuff, breccia and agglomerate. Also epiclastic sediments and subvolcanic intrusives.

DRILLHOLE ID (if applicable): WCDD003
PROSPECT (if applicable): West Copper Deeps
DEPTH FROM (metres): 382.3
DEPTH TO (metres):382.4

* 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?

What is the age of alteration/mineralisation within the Drake Goldfield, does it differ across widely spaced deposits and is it different from the magmatic age of crystallisation of the host volcanics?

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

Alteration/Mineralisation

Mineral target(s) for dating:

Iliite/muscovite

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

Palaeozoic-Mesozoic, younger than 265.3 Ma (U-Pb ages of zircon from host tuffs at both Red Rock and White rock deposits)(Waltenberg et al. 2016).

Sample Information

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

Drillcore sample from the West Copper Deeps prospect was collected 2.63 km from Drake Village.

Lithological characteristics (rock description):

Dacitic lithic-vitric crystal tuff

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

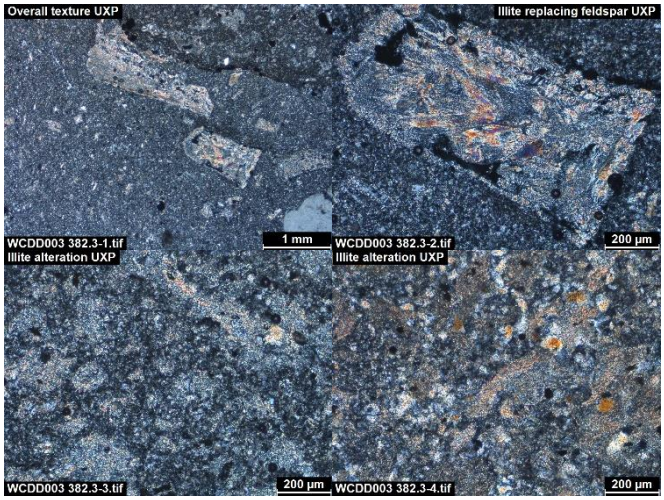
U-Pb zircon geochronology gave ages of 265.3 ± 1.4 Ma (Red Rock field) and 265.3 ± 1.5 Ma (White Rock field) from the host volcanic tuffs within the Drake Goldfield (Waltenberg et al., 2016).

Thin section description (if available):

Dacitic (Vitric) crystal tuff
Phenocrysts: quartz, altered feldspar
Groundmass: Pervasive illite alteration in feldspathic fine-grained matrix, with minor chlorite and carbonate alteration.

Quantitative XRD: 71.3 wt% quartz, 15.6 wt% muscovite, 8.4 wt% pyrite and 4.7 wt% chlorite.
Photograph(s) e.g. field site, hand-specimen, photomicrograph:

HAND-SPECIMEN IMAGE OF WCDD003 - 382.3.



Photomicrographs for WCDD003 382.3

Relevant bibliographic references:

1. White Rock Minerals. Mt Carrington Project: overview, geological setting, resources, development, exploration gold and silver, and exploration copper. 2020 [cited 2019 07/08/2019]; Available from: https://www.whiterockminerals.com.au/mt-carrington-overview.

2. Andrews, E.C., Report on the Drake Gold and Copper Field by EC Andrews, Geol. Surveyor. 1908: WA Gullick.

3. Perkins, C. The red rock deposit: a late Permian submarine epithermal precious metal system in Northastern New South Wales. in Pacific Rim 87. International congress on the geology, structure, mineralisation and economics of Pacific Rim. 1987.

4. White Rock Minerals, Exceptional Updated Gold Pre-Feasibility Result, in ASX Announcement 19th August 2020. 2020.

5. White, V., Volcanic facies and its relationship to silver mineralisation, White Rock and White Rock North epithermal deposits, Drake Goldfield, NE NSW. 2017, University of New South Wales, Sydney, Australia.

6. Zhang, H., Relationship between alteration assemblages, alteration intensity and mineralisation and grade for the Lady Hampden epithermal Au-Ag deposit, Drake, north-eastern NSW,. 2016, University of New South Wales, Sydney, Australia.

7. Chomiszak, G., Relationship between alteration assemblages, their intensity and mineralisation and grade at the White Rock Epithermal Ag deposit, Drake, northeastern NSW. . 2016, University of New South Wales, Sydney, Australia.

8. Lay, A., A comparative study of the mineralogy and geochemistry of ore minerals from silver-rich polymetallic deposits of the Lachlan and Southern New England Orogens, New South Wales, Australia. 2019, University of New South Wales. p. 261.

9. Murray, C., Tectonic evolution and metallogenesis of the New England Orogen. New England Orogen-tectonics and metallogenesis (Kleeman, JD Ed.). University of New England, Armidale, Australia, 1988: p. 204-210.

10. Cummings, G., New geological constraints for the Drake Volcanics, Drake Area, Northern NSW. 2011: Internal Report for White Rock Minerals Ltd.

11. Waltenberg et al. New SHRIMP U-Pb zircon ages from the Lachlan orogen and the New England Orogen, New South Wales. Geoscience Australia Record 2016/28 and Geological Survey of New South Wales Report GS2016/0810, 2016.