

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: Joan Esterle
Affiliation: SCHOOL OF EARTH AND ENVIRONMENTAL SCIENCES, UNI QLD
Project Title: STRATIGRAPHY AND MINERALOGY OF CENOZOIC SEDIMENTS OVERLYING THE MORANBAH AND RANGAL COAL MEASURES
Sample Number(s) (including IGSN if one exists): CAL
Mineral separation required? Yes or No: No
Date submitted: TBA

GEOGRAPHIC AREA/ PROVINCE/ BASIN : CENTRAL QUEENSLAND; BOWEN BASIN (SOUTH WALKER CREEK)	
1:250k SHEET NAME: BOWEN BASIN REGIONAL	NUMBER:
1:100k SHEET NAME: HARRYBRANDT	NUMBER: 8554
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94) WGS84	
ZONE: 55	
EASTING: 650630	NORTHING: 7591508
LATITUDE: 21.773692° S	LONGITUDE: 148.456893° E

STRATIGRAPHIC UNIT FORMAL NAME *:
STRATIGRAPHIC UNIT INFORMAL NAME: Mafic intrusions
LITHOLOGY: Gabbro

DRILLHOLE ID (if applicable):
PROSPECT (if applicable): SOUTH WALKER CREEK MINE
DEPTH FROM (metres):
DEPTH TO (metres):

* 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 age of the mafic intrusions by absolute age dating

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

Mineral target(s) for dating: whole rock.

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

Sample Information

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

At South Walker Creek coal mine

Lithological characteristics (rock description):

Gabbro: fresh, medium to dark grey, fine grained. Hydrothermal alteration observed on thin section, with few original textures remaining

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

Intrusive into Carboniferous sediments

Thin section description (if available):

The original mineralogy was olivine, plagioclase and augite, with accessory magnetite, some pyrite and possibly a late-cooling phase of apatite, however most of the original phases have undergone alteration to varying extents. Olivine in all samples has been altered to serpentine and talc before being pseudomorphed to calcite. Serpentinized olivine with accessory talc is still present in some samples, however most olivine phenocrysts have been pseudomorphed to calcite.

Apatite was microscopic but abundant in the groundmass of the rock; mainly acicular, but with some secondary phase crystals (See Figure 6). Secondary apatite crystals cut across the plagioclase and chamosite crystals, indicative of a later phase of crystallization. Apatite was also observed to be more densely distributed in the groundmass in proximity to calcite. Most of the plagioclase was affected by saussuritization to some degree, and the original clinopyroxene phase has been almost completely altered to the Fe-chlorite phase chamosite. The opaque phase is pyrite with some minor magnetite. The original olivine phase has been completely pseudomorphed by calcite, with no trace of olivine alteration products (see Figure 7).

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



Figure 1: Calypso Dyke bulk sample

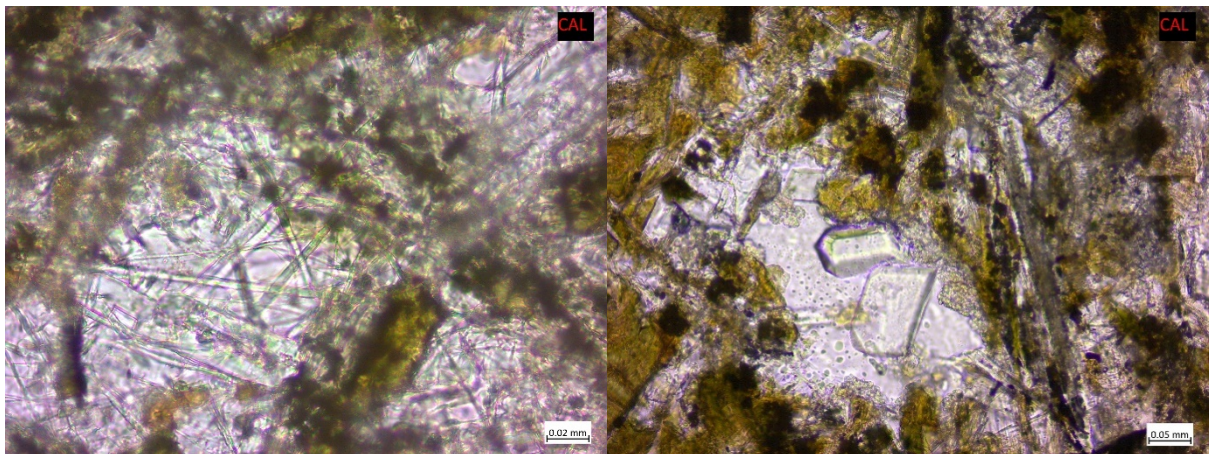


Figure 1: Apatite crystals in CAL

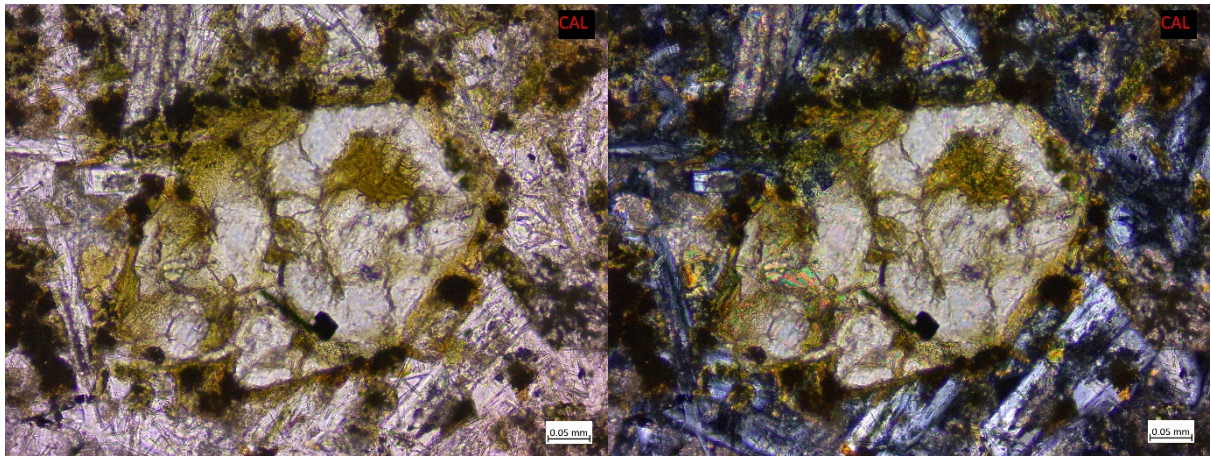


Figure 2: Olivine replaced with calcite and chamosite in cracks and around grain boundaries in CAL

Relevant bibliographic references:

Franks, Daniel. 2020. *Magmatic events in the South Walker Creek area and their relationship to coal mineralogy*. MSc thesis. University of Queensland.

Maunder, Bryden. 2020. *Mineralogy, geochemistry and geochronology of gouge material found in faults and fractures at the South Walker Creek coal deposit, Queensland*. Honours thesis. University of Queensland.