Metasedimentary migmatite 228679

Person submitting samples: Catherine Spaggiari / Dave Kelsey
Affiliation: Geological Survey of Western Australia
Project Title: Project Manager / Senior Geologist
Sample Number(s) (including IGSN if one exists): 228679
Mineral separation required? Yes or No: Yes
Date submitted: May 2020

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Kiwirkurra Community / West Arunta Orogen	
1:250k SHEET NAME: Wilson	**NUMBER:** SF 52-9
1:100k SHEET NAME: Top Up Rise	**NUMBER:** 4352
LOCATION METHOD: (GPS: GDA94)	
ZONE: 52	
EASTING: 339159	**NORTHING:** 7497798
LATITUDE: -22.61912	**LONGITUDE:** 127.43503

STRATIGRAPHIC UNIT FORMAL NAME *: No formal names as yet for the Top up Rise samples
STRATIGRAPHIC UNIT INFORMAL NAME: TBC, based on new U-Pb data in progress and geochemistry.
LITHOLOGY: Metasedimentary migmatite

DRILLHOLE ID (if applicable): TUR13DD003
PROSPECT (if applicable): Top Up Rise
DEPTH FROM (metres): 799.32
DEPTH TO (metres): 799.43

* 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?

The ages of metamorphism and deformation events; to compare to the Mundrabilla Shear Zone samples.

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

Cooling age of metamorphism and foliation growth.

Mineral target(s) for dating:

Muscovite and sericite

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

Younger than c. 1870 Ma; likely younger than c. 1610 Ma.

Sample Information

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

Top up Rise samples come from the Top up Rise prospect drillcores, which were drilled approximately 41 km northwest of Kiwirkurra, in the Gibson Desert. These rocks lie beneath the Canning Basin, and no other information about them is available.

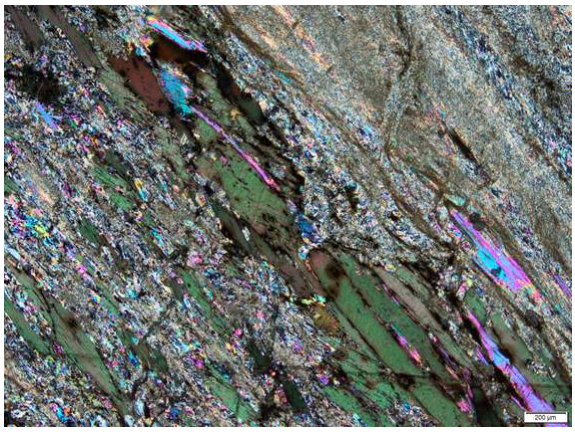
Lithological characteristics (rock description):

Medium-grained, homogeneous metasedimentary rock with migmatitc textures. Dominated by quartz, biotite, plagioclase. Patchy leucosomes, locally with pink feldspar. Small patches of coarse-grained leucosomes with pink feldspar sub-parallel (likely syn) to foliation. All are cut by thin pink granitic/felsic veinlets, also some thin dark veinlets. Late, thin, ?chlorite + quartz veinlets throughout. Above the sample coarse pegmatitic patches dominated by pink feldspar occur, which are also quite altered (epidote, silica) and brecciated.

Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):
SHRIMP U-Pb dating is in progress. Preliminary data indicates 1880 ± 5 Ma and 1872 ± 5 Ma for magmatic crystallization of a granite protolith to granite gneiss, and c. 1610 Ma for high grade metamorphism.

Thin section description (if available):
Muscovite, biotite, and fibrolitic sillimanite matted aggregates. Not fresh, heavily altered. In parts of the rock where muscovite is coarser (not sericite) there are many tiny grains of Fe-Ti oxide (ilmenite & magnetite). These grains are so tiny that many of them are beneath the surface of the thin section. The fabric in the rock is defined by grains and aggregates of biotite that alternate and are interlayered with muscovite+oxide and sericitic layers (completely to partially altered feldspar) and rarer grains of coarse muscovite. A younger generation of finer-grained biotite is unoriented and occurs with unoriented, but recognisable grains of fine-grained muscovite. This younger biotite occurs at the contact with quartz, whereas muscovite occurs further away from that boundary. Coarse-grained epidote is rare but occurs in a layer at one end of the thin section. At the other end, late chlorite occurs at the margin of coarse quartz grains that are part of a boudinaged quartz + feldspar vein or layer. The chlorite is oriented orthogonally to the vein and therefore orthogonally to the main fabric of the rock. Radiation damage halos are common in biotite. The coarse-grained assemblage is biotite + muscovite + quartz + feldspar (+/- epidote). The later minerals are biotite, muscovite/sericite and chlorite.

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



Relevant bibliographic references:
Top up Rise prospect:
Nothing published as yet. There is a company report on the drillcores:
Border Exploration, 2013, Geological Survey of Western Australia, Statutory mineral exploration report A099481, 29p.

Relevant information:
JA Hollis, CL Kirkland, CV Spaggiari, IM Tyler, PW Haines, MTD Wingate, EA Belousova, and RC Murphy, 2013, Zircon U-Pb-Hf isotope evidence for links between the Warumpi and Aileron Provinces, West Arunta Region: Geological Survey of Western Australia Record 2013/9, 30p.

Spaggiari, CV, Haines, PW, Tyler, IM, Allen, HJ, de Souza Kovacs, N and Maidment, D 2016, Webb, WA Sheet SF 52-10 (2nd edition): Geological Survey of Western Australia, 1:250 000 Geological Series.

Haines, PW, de Souza Kovacs, N, Spaggiari, CV, Eacott, G, Allen, HJ, Tyler, IM, Maidment, DW, and Murdie, RE 2018, MacDonald, WA Sheet SF 52-14 (2nd edition): Geological Survey of Western Australia, 1:250 000 Geological Series