Sample 1 of 20: 232630

Person submitting samples: Dave Kelsey
Affiliation: Geological Survey of Western Australia
Project Title: Tectonism and Exhumation of the Paterson Orogen and East Pilbara Craton margin
Sample Number(s) (including IGSN if one exists): 232630
Mineral separation required? Yes or No: yes
Date submitted:

GEOGRAPHIC AREA/ PROVINCE/ BASIN : Gregory Range (Pilbara Craton)	
1:250k SHEET NAME: Nullagine	**NUMBER:** SF51-05
1:100k SHEET NAME: Braeside	**NUMBER:** 3155
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94) GDA94	
ZONE: 51	
EASTING: 310666	**NORTHING:** 7657106
LATITUDE: *-21.17762000*	**LONGITUDE:** *121.17630000*

STRATIGRAPHIC UNIT FORMAL NAME *: Gregory Range Suite
STRATIGRAPHIC UNIT INFORMAL NAME:
LITHOLOGY: quartz syenite

DRILLHOLE ID (if applicable):
PROSPECT (if applicable):
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 $^{40}Ar/^{39}Ar$ analysis will address?

What is the cooling/exhumation age from this sample? We are seeking to address whether the cooling age is related to the initiation or inversion of the Neoproterozoic Yeneena Basin, as the Gregory Range has many NNW-trending faults that are likely to be basin-bounding faults active at the time of Yeneena Basin initiation and/or inversion.

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

Cooling/exhumation.

Mineral target(s) for dating:

Hornblende

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

Mid- to Late-Neoproterozoic

Sample Information

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

WAROX database (field observations) site HMHHAM000287. Small granite tor.

Lithological characteristics (rock description):

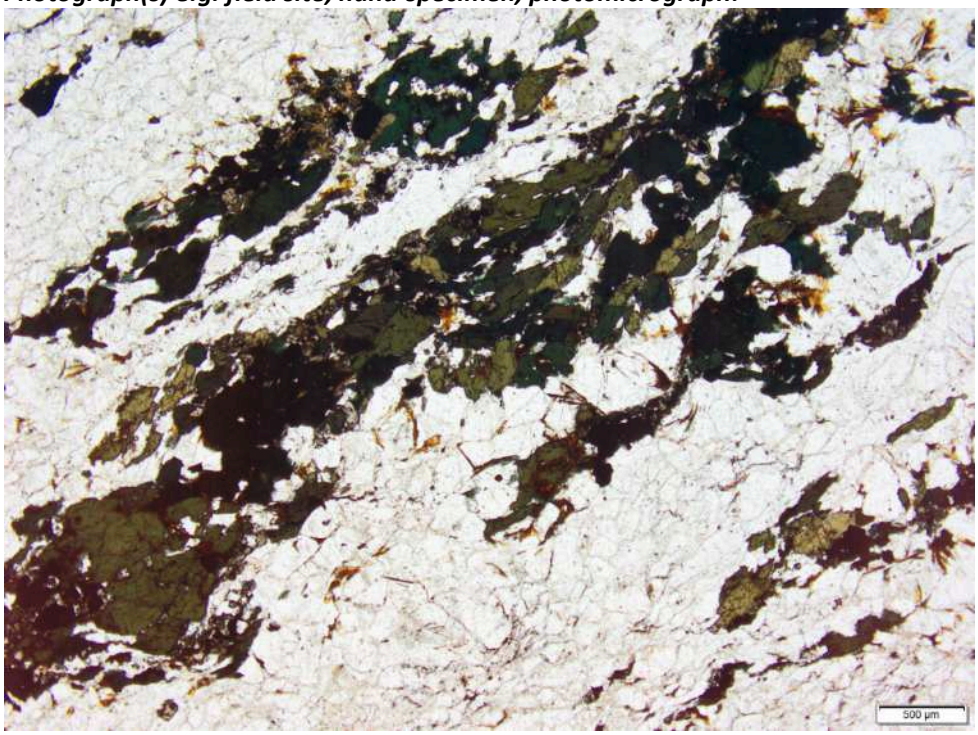
Medium-grained possible quartz syenite in the Gregory Range suite. Similar to those south of the Telfer road.

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

Magmatic or extrusive age is 2763—2757 Ma. Cooling/exhumation age is expected to be Neoproterozoic, corresponding to the Miles (c. 810 – 650 Ma) or Paterson (c. 550 Ma) Orogenies.

Thin section description (if available):
Porphyritic plagioclase + K-feldspar + quartz + ilmenite +titanite + hornblende + biotite bearing granitic gneiss. The matrix of the rock is fine-grained and has an inequigranular – interlobate grain shape and texture. Foliation is defined by elongate and grain-size reduced quartz that features internal sub-grains as well as hornblende grains and aggregates. Hornblende is rarely porphyroclastic and in most cases occurs as elongate aggregates of anhedrally shaped grains. Lesser biotite, titanite and ilmenite occur in/amongst the hornblende aggregates. Some ilmenite has a corona of titanate. Quartz is dynamically recrystallised, suggestive of high/elevated strain.

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



Relevant bibliographic references:
Williams, IR and Trendall, AF 1996, Braeside, WA Sheet 3155: Geological Survey of Western Australia, 1:100 000 Geological Series.

Williams, IR and Hickman, AH 2007, Nullagine, WA Sheet SF 51-16 (3rd edition): Geological Survey of Western Australia, 1:250 000 Geological Series.