

## Sample 4 of 20: 100592

<b>Person submitting samples:</b> Dave Kelsey
<b>Affiliation:</b> Geological Survey of Western Australia
<b>Project Title:</b> Tectonism and Exhumation of the Paterson Orogen and East Pilbara Craton margin
<b>Sample Number(s) (including IGSN if one exists):</b> 100592
<b>Mineral separation required? Yes or No:</b> yes
<b>Date submitted:</b>

<b>GEOGRAPHIC AREA/ PROVINCE/ BASIN :</b> Gregory Range (Pilbara Craton)	
<b>1:250k SHEET NAME:</b> Nullagine	<b>NUMBER:</b> SF51-05
<b>1:100k SHEET NAME:</b> Pearana	<b>NUMBER:</b> 3154
<b>LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94)</b> GDA94	
<b>ZONE:</b> 51	
<b>EASTING:</b> 334599.81	<b>NORTHING:</b> 7594199.97
<b>LATITUDE:</b> -21.74809000	<b>LONGITUDE:</b> 121.40057000

<b>STRATIGRAPHIC UNIT FORMAL NAME *:</b> Gregory Range Suite
<b>STRATIGRAPHIC UNIT INFORMAL NAME:</b>
<b>LITHOLOGY:</b> hornblende–biotite syenogranite

<b>DRILLHOLE ID (if applicable):</b>
<b>PROSPECT (if applicable):</b>
<b>DEPTH FROM (metres):</b>
<b>DEPTH TO (metres):</b>

\* 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  $^{40}\text{Ar}/^{39}\text{Ar}$  analysis will address?**

What is the cooling/exhumation age from this sample?

**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  $^{40}\text{Ar}/^{39}\text{Ar}$  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 GSD100592.

**Lithological characteristics (rock description):**

High-strain (protomylonitic) hornblende–biotite syenogranite. Titanite, epidote, hornblende, biotite, quartz, feldspar. Rock is strongly deformed, as evidenced by quartz, but the rock doesn't have a strong fabric. Relative to hornblende abundance, titanite is abundant.

**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):***

Plagioclase, quartz, K-feldspar (mainly as microcline), hornblende, titanite, biotite, ilmenite bearing granite. The foliation is defined by a combination of aggregates of hornblende and biotite in which the individual grains are not necessarily strongly oriented, as well as strongly grain-size reduced and deformed and recrystallised quartz and feldspar. Those quartz and feldspar grains show a combination of dynamic recrystallization and subgrain rotation recrystallization and define local protomylonitic foliae that anastomose through the rock and around porphyroclasts. Hornblende rarely occurs as porphyroclasts, more typically as aggregates of smaller grains along with biotite. Biotite has a greenish pleochroism and is more abundant than hornblende. The grain shape of both minerals is typically anhedral. Titanite is common and occurs as single larger grains or grain aggregates commonly with hornblende and/or biotite. The rock grain shape texture is seriate–interlobate overall.

***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.*