

# *Pontifex & Associates Pty Ltd*

MINERALOGY – PETROLOGY · SECTION PREPARATION

A.B.N. 25 007 521 084

26 Kensington Rd, Rose Park  
South Australia 5067  
Tel: +61 8 8332 6744  
Fax: +61 8 8332 5062

PO Box 91  
Kent Town SA 5071  
AUSTRALIA

**Email:**  
ian@pontifexpetrographics.com.au  
**Website:**  
www.pontifexpetrographics.com.au

## **MINERALOGICAL REPORT No. 9506**

*by Alan C. Purvis, PhD*

March 18, 2009

**TO :**

Kate Radford  
Cameco Australia Pty Ltd  
P.O. Box 35921  
Winnellie NT 0820

**YOUR REFERENCE :**

Order No.6913 (part)

**MATERIAL &  
IDENTIFICATION:**

Beatrice Project  
BT08-0003 to 0018

**WORK REQUESTED :**

Thin section preparation, description and report  
with photomicrographs.

**SAMPLES & SECTIONS :**

Returned to you with this report.

**DIGITAL COPY :**

CD enclosed with hard copy of this report.

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## **SUMMARY COMMENTS**

The four rock samples described in this report from normal thin sections are from the Beatrice Project, Arnhem Land, N.T. These were identified in thin section as follows:

Sample	Lithology	Alteration
BT08-0003	Tonalite gneiss with minor K-spar	Sericite-chlorite-prehnite-altered, weakly iron-stained.
BT08-0009	Biotite-hornblende quartz monzodiorite gneiss	Sericite in plagioclase and prehnite in biotite.
BT08-0015	Hornblende-biotite granodiorite gneiss	Sericite, chlorite, clays and prehnite.
BT08-0018	Quartz-orthoclase-biotite-garnet-plagioclase gneiss (psammitic?)	Sericite in plagioclase.

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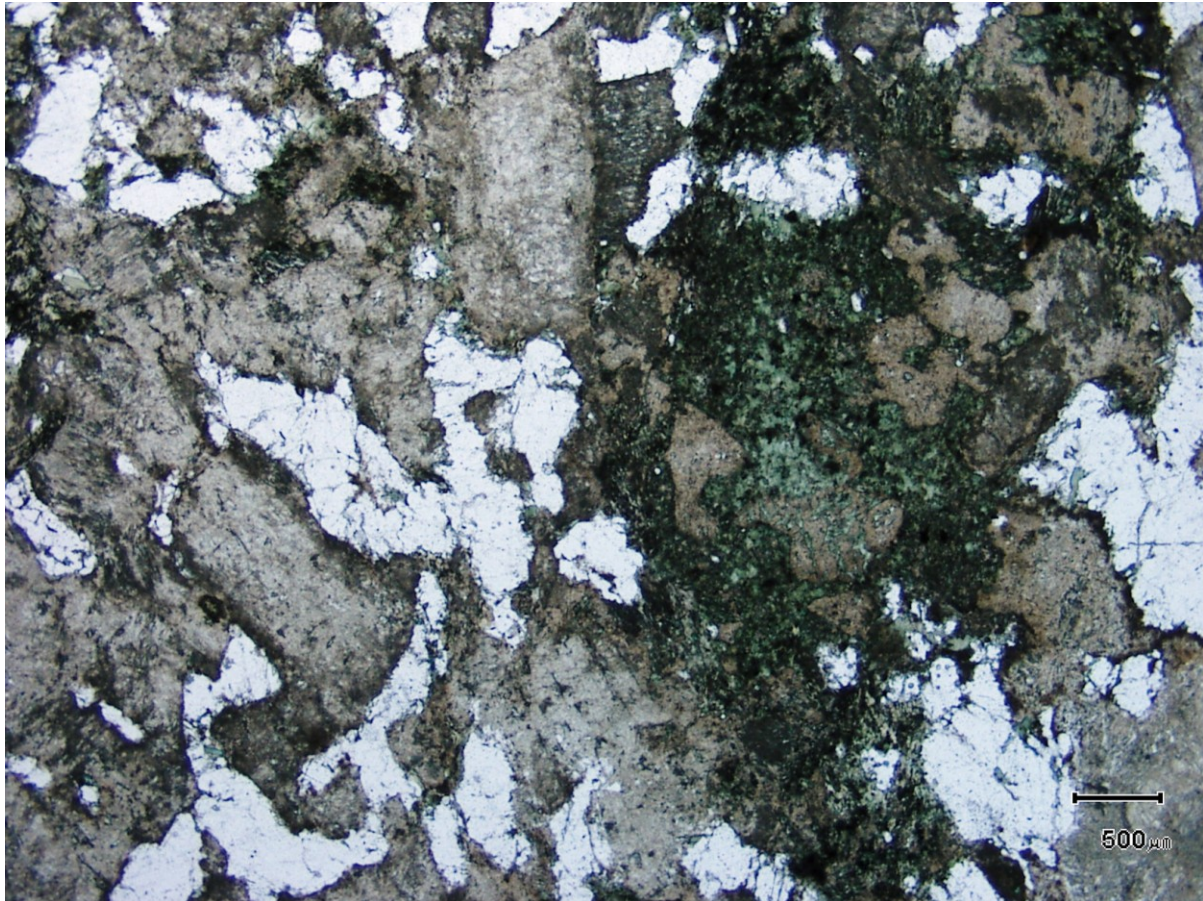
## INDIVIDUAL DESCRIPTIONS

**BT08-0003**                      **Sericite-chlorite-prehnite-altered, weakly iron-stained tonalite gneiss with minor K-spar.**

**Field Note:**    *Moderately foliated gneiss with approximately 30% pale-green sericitised plagioclase and 20% pink K-spar?*

This sample has possibly 25% quartz to 3mm in grainsize and 5% former decussate biotite to 2mm in grainsize altered to chlorite and leucoxene ± prehnite. There is less than 5% orthoclase, weakly clouded by clays, but plagioclase, altered to sericite and partly stained by hematite, is abundant (~65%). Hematite staining is most obvious in and adjacent to a poorly defined vein-like array close to one end of the thin section. There is also a fracture filled with chlorite and prehnite.

The original lithology seems to have been tonalitic gneiss with a foliation defined by subparallel feldspar laths rather than by altered biotite.



**Fig 1**

**Bt08-0003**

500 μm

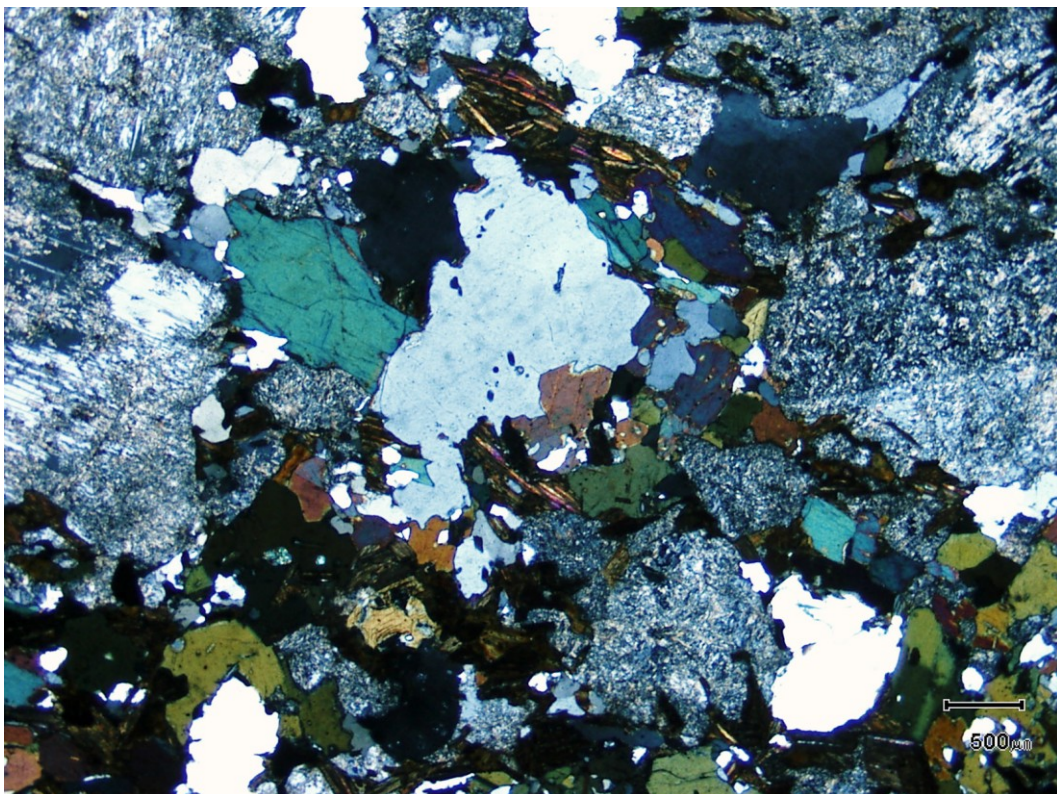
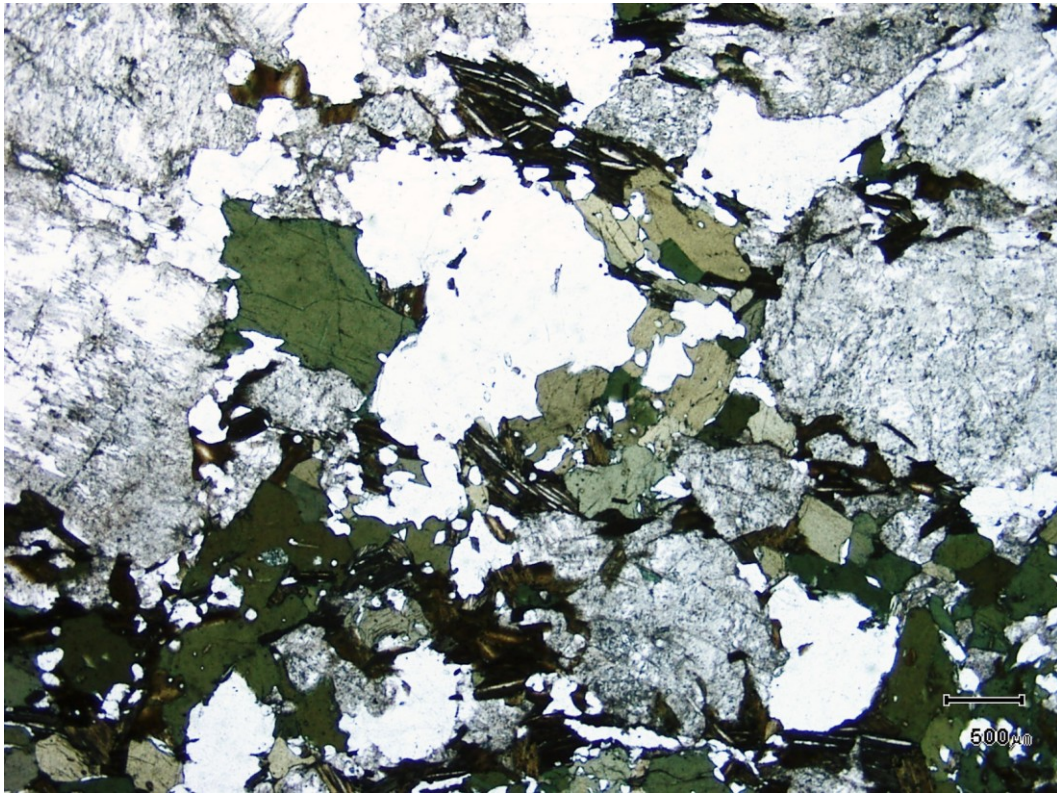
Thin section (TS) Plane polarised light (PPL) (x20) Tonalite gneiss with clear quartz, clouded sericitised plagioclase, and patchy dark green chlorite ex-biotite?

**BT08-0009**

**Weakly altered biotite-hornblende quartz monzodiorite gneiss with sericite in plagioclase and prehnite in biotite.**

**Field Note:** *Medium-grained seriate gneiss: sericitised feldspars ~20%*

This sample represents relatively mafic quartz monzodiorite gneiss with a visually estimated primary mineralogy containing 50% plagioclase, 20% hornblende, 14% quartz, 9% biotite and 7% K-spar. The plagioclase is coarse-grained, to 4 or 5mm in grain size, and partly altered to sericite, but the K-spar is fresh and occurs as anhedral grains to 10mm or more in length. Quartz is also anhedral and as much as 3-4mm in grain size. Lenses and lamellae of hornblende and biotite are abundant and define a weak foliation, although individual grains are poorly oriented. The hornblende is olive-green and mostly granular with rare hornblende-quartz symplectites. The biotite is weakly foliated and has possible clay alteration and lenses of prehnite parallel to the cleavage. Accessories include apatite, zircon to 0.15mm in grain size and altered possible allanite.



**Fig 2 & 3**

**BT08-009**

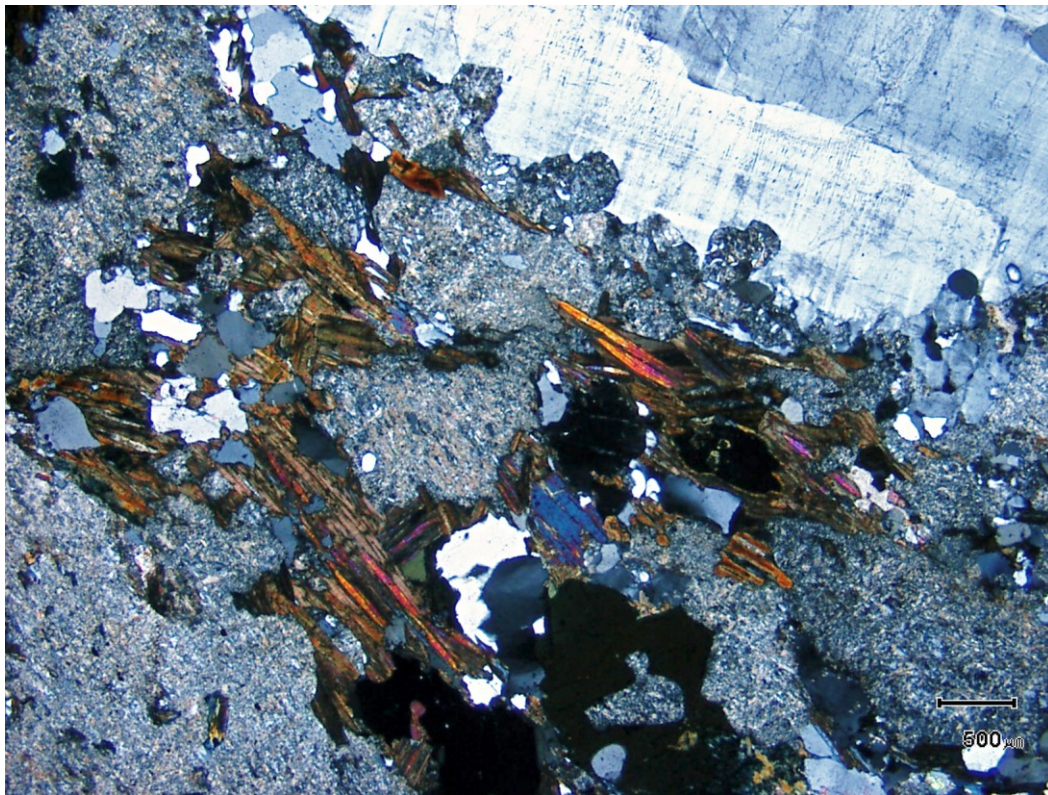
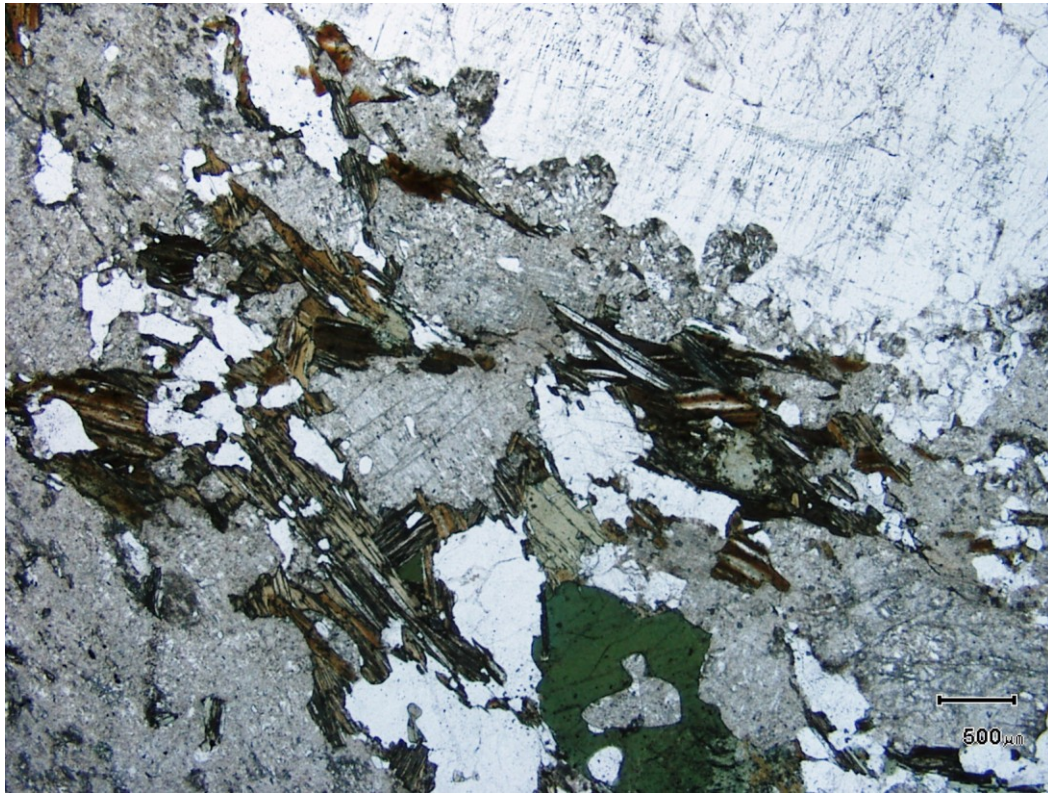
500 μm

Fig 2: TS PPL Fig 3: Crossed nicols (Xnic) (x20) Quartz-microdiorite gneiss, with central clear quartz, sericite clouding plagioclase, and thin colored lamellae of prehnite parallel to the cleavage in biotite. Scattered green hornblende.

**BT08-0015**                      **Altered hornblende-biotite granodiorite gneiss with  
sericite, chlorite, clays and prehnite.**

**Field Note:**    *Foliated granite: biotite-rich, chloritised feldspar-feldspar phenocrysts; large  
white K-feldspar phenocrysts*

This is a sample of foliated granodiorite with a visually estimated primary mineralogy containing about 48% plagioclase, 22% quartz, 11% K-spar, 11% biotite, 8% hornblende and accessory apatite + minor zircon to 0.15mm in grainsize. The plagioclase is mostly less than 5mm in grainsize and strongly altered to sericite or illite. Microcline is irregularly disseminated as phenocrysts or megacrysts to 30mm long with small inclusions of quartz and plagioclase. The quartz is anhedral and as much as 7mm long, commonly subparallel to the foliation. Lenses of foliated biotite and/or hornblende occur, as in the previous sample, with hornblende and biotite to 2mm in grainsize defining a recrystallised anastomosing foliation. There is some possible clay alteration of biotite and lenses of prehnite parallel to the cleavage. The hornblende shows localised alteration to chlorite. Apatite and zircon are mostly within biotite lenses or in hornblende.



**Fig 4 & 5**

**BT-08-0015**

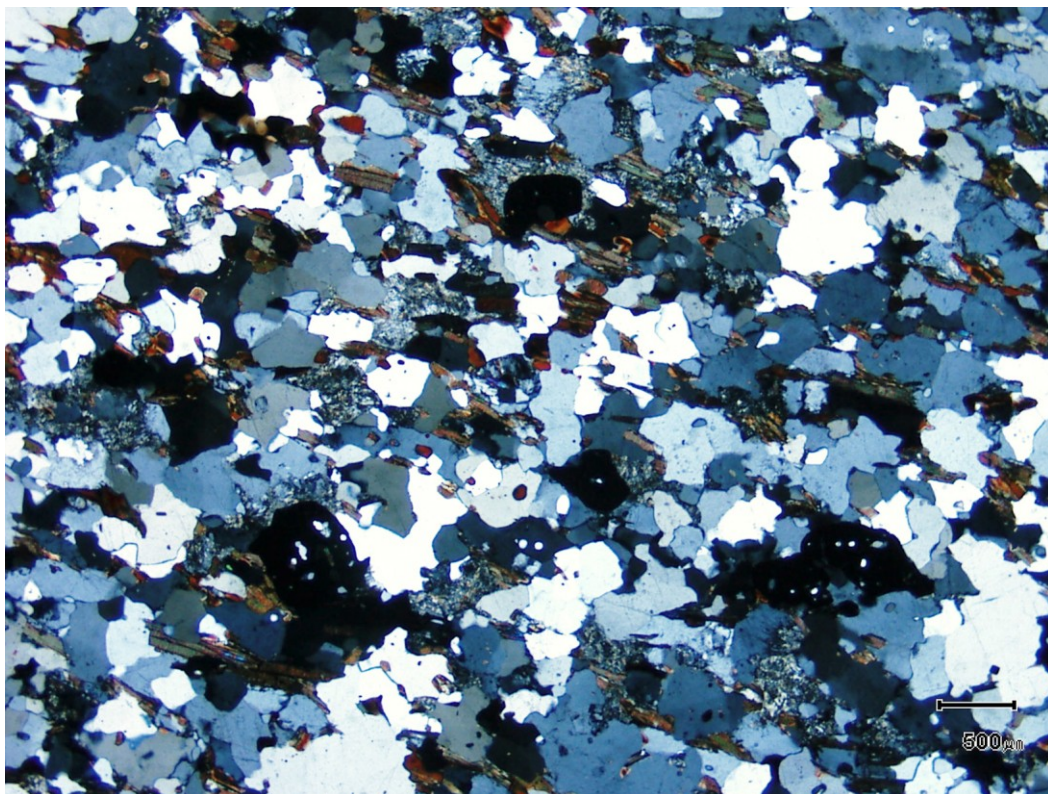
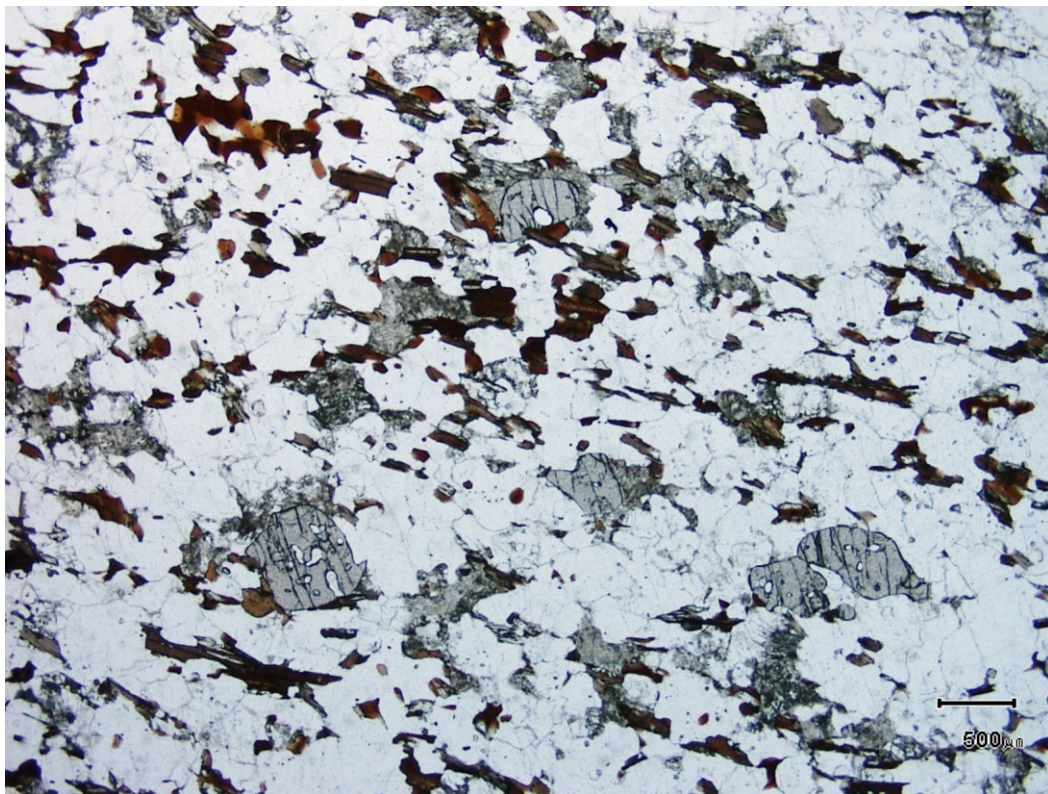
500 μm

Fig 4: TS PPL, Fig 5: Xnic, (x20) Hornblende-biotite grandiorite gneiss, with sericite clouding plagioclase, and thin colored lamellae of prehnite parallel to the cleavage in biotite. Large microcline grain in NE quadrant.

**BT08-0018**                      **Probably psammitic quartz-orthoclase-biotite-garnet-plagioclase gneiss with sericite in plagioclase.**

**Field Note:** *Garnetiferous biotite-rich orthogneiss: very strongly foliated: grey-white banded with pink garnets; no chlorite or hematite alteration.*

This sample seems to be composed of paragneiss with about 60% quartz as well as 18% orthoclase, 10% biotite, 7% garnet and 5% partly sericitised plagioclase. Lamellae are variously rich in quartz, biotite, orthoclase or garnet with some lamellae also containing altered plagioclase. Quartz and orthoclase are mostly less than 2mm in grain size, with abundant biotite to 1.5mm long and plagioclase to 4mm, albeit mostly fine-grained. Rare zircon is 0.1-0.15mm in grain size. This seems to represent metasandstone (psammite) and has a strong planar foliation.



**Fig 6 & 7**

**BT-08-0018**

500 μm

Fig 6: TS PPL , Fig 7: Xnic, (x20) Metamorphic granulow aggregate incorporating weak mica-schistosity forming a micro-greiss, derived from a psammitic precursor. Composed of quartz-orthoclase-biotite-garnet-plagioclase. Garnets are clouded with high RI in Fig 6, and black-isotropic in Fig 7.