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- GEOCHEMISTRY - PETROLOGY - GEOLOGY

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PETROGRAPHIC AND MINERAGRAPHIC DESCRIPTIONS

TKRC, TARC & MARC SERIES - BRIEF PETROGRAPHIC DESCRIPTIONS

SAMPLE NO: TKRC 100002 183 – 189 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

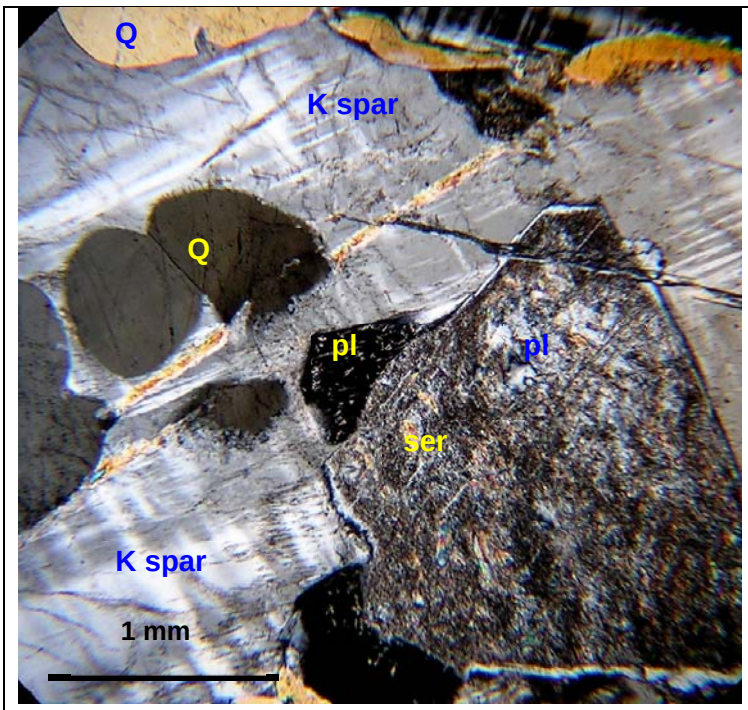
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Weakly altered granite.

DESCRIPTION: A coarse allotriomorphic granular plutonic texture is apparent for the assemblage that comprises course (up to 8mm) potash feldspar – microcline (62 vol%) associated with anhedral quartz (20 vol%). Plagioclase – oligoclase (originally 17 vol%) has been pervasively sericitised and represents the altered feldspathic phase in hand specimen. Microcline can be clay dusted and locally exhibits granophyric textures in contact with quartz. Platy muscovite represents a integral part of the assemblage and can exhibit symplectic textures with fine quartz inclusions.

Comments: The course plutonic assemblage comprises potash feldspar associated with plagioclase and quartz in proportions that suggest a syenogranite classification. The selective sericitisation of plagioclase and localised clay – alteration of microcline suggest autometasomatic alteration of the intrusive assemblage.

CLASSIFICATION: *Autometasomatically altered (clay, sericite) coarse grained syenogranite intrusive.*



Sample TKRC 100002 183 – 189 m
Coarse potash feldspar – microcline contains anhedral quartz (Q) inclusions and sericitised (ser) plagioclase in the allotriomorp[hic granular plutonic host. The assemblage is classified as a syenogranite. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TKRC 100002 300 – 302 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

SECTION TYPE: Thin Section

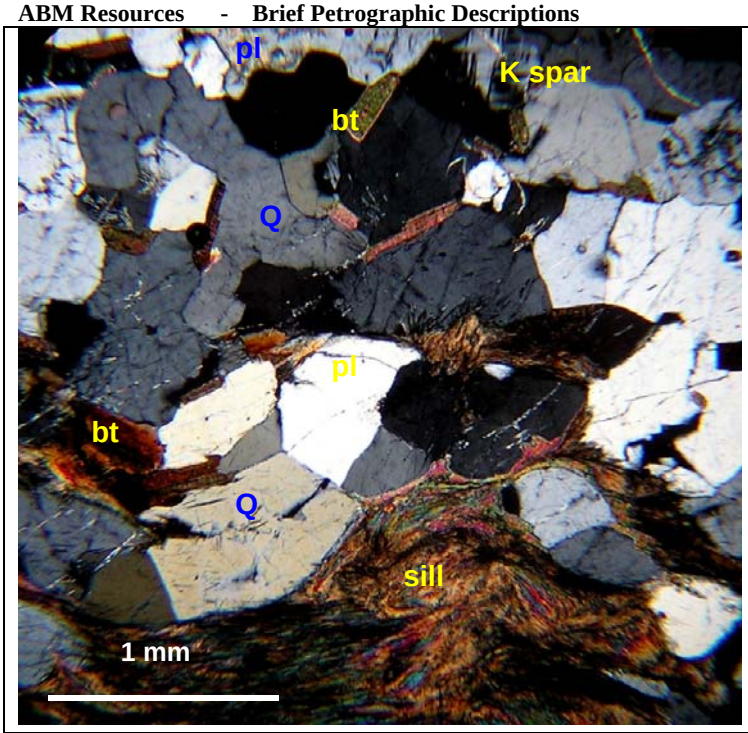
FIELD IDENTIFICATION: Altered, sheared granite possibly intruding a felsic gneiss.

DESCRIPTION: One chip has preserved a fine to medium grained, gneissic texture where platy oriented platy biotite (to Fe/Mg chlorite) (8 vol%) occurs in a granoblastic quartz – minor plagioclase matrix. Potash feldspar – microcline occurs as a minor phase. The plagioclase component has been incipiently sericitised. Distinctive, fibrous sillimanite (fibrolite) lenses and fibrous inclusions occur in the prograde metamorphic host, and can be closely associated with platy, foxy red biotite. Accessories include fine xenoblastic garnet, fine xenoblastic to subidioblastic titanite and fibrous to platy muscovite that has locally replaced sillimanite as a retrograde phase.

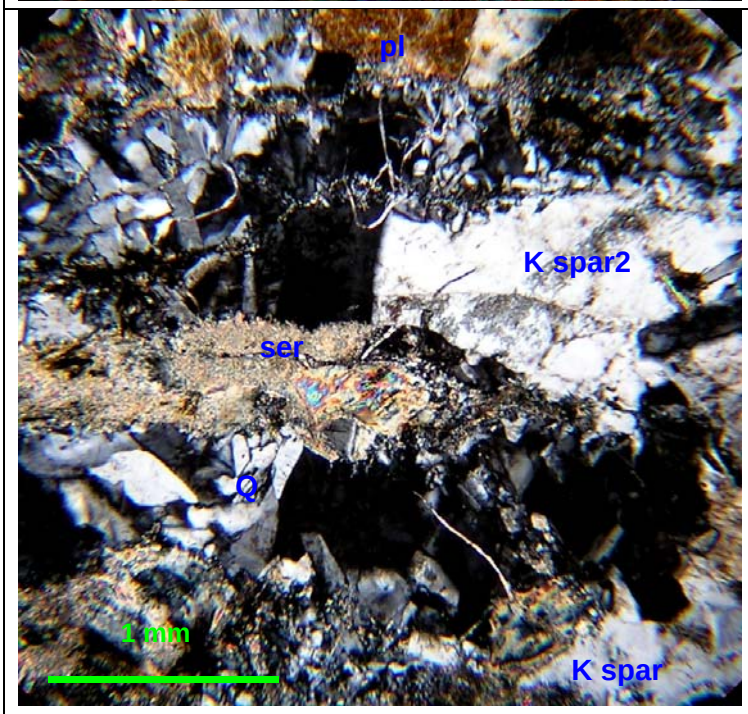
Another chip has been subject to deformation and concomitant metasomatic alteration. The fine to medium grained granoblastic matrix comprised quartz and feldspar. The plagioclase component has been pervasively clay – sericite altered. Fibrous sillimanite (fibrolite) inclusions occur in the metamorphic host that also contains poikiloblastic potash feldspar – microcline and accessory subidioblastic titanite. There is evidence of brecciation of the metamorphic host associated with the development of scaly sericite schlieren and the penetration of the matrix by secondary potash feldspar that has been locally clay - dusted. Platy Fe/Mg chlorite would appear to be in equilibrium with potash feldspar as a retrograde replacement of original biotite.

Comments: One quartzofeldspathic chip has clearly preserved a gneissic texture and along with the presence of fibrous sillimanite and accessory garnet suggest a psammopelitic precursor that has been regionally metamorphosed to upper amphibolite facies. Deformation of the host metamorphic assemblage has been accompanied by penetration of the matrix by secondary potash feldspar as a product of metasomatism.

CLASSIFICATION: *Quartz plagioclase potash feldspar biotite sillimanite trace garnet prograde representing a metamorphosed psammopelite that is stable under upper amphibolite facies. The assemblage has been subject to further deformation and the penetration of the matrix by potash feldspar as a product of metasomatism.*



Sample TKRC 100002 300 – 302 m
Fibrous sillimanite (fibrolite - sill) occurs in the quartzofeldspathic gneissic host comprising granoblastic quartz associated with plagioclase (pl), ptash feldspar – microcline (K spar) and platy biotite (bt). Crossed polars. Field of view – 3 mm.



Sample TKRC 100002 300 – 302 m
A more strongly deformed and altered chip where a scaly sericite lens has been enveloped by secondary potash feldspar (K spar2) as a product of metasomatism in the quartzofeldspathic gneissic host. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TKRC 100003 214 – 215 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

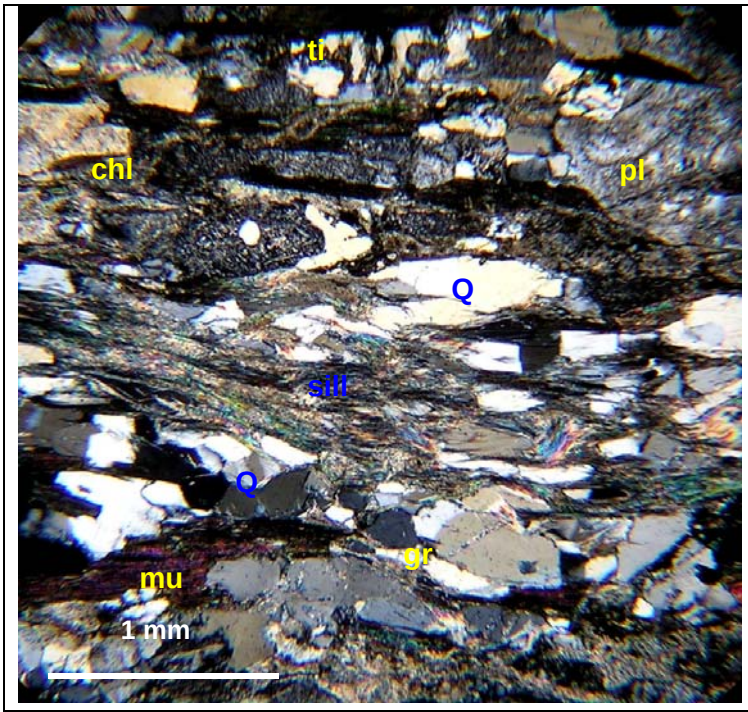
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Sheared, retrogressed quartzzofeldspathic gneiss.

DESCRIPTION: The fine to medium grained, gneissic assemblage is similar to the metamorphic host in Sample TKRC 100002 300 – 302 m. Original platy biotite paralleling the gneissosity has been replaced by Fe/Mg chlorite and occurs in the granoblastic quartz – plagioclase matrix. Plagioclase dominates in the matrix and has been pervasively incipiently altered to fibrous to scaly sericite and dusted clays. Potash feldspar – microcline occurs as a minor phase. Fibrous, pale coloured amphibole – grunerite (?) occurs as schlieren paralleling the schistosity that has overprinted the gneissosity. Minor accessory xenoblastic titanite.

Comments: The quartzofeldspathic gneissic host comprised oriented platy biotite and was stable under a regional amphibole facies metamorphic regime. Retrograde alteration including sericitisation of plagioclase and replacement of biotite to Fe/Mg chlorite has accompanied a deformation overprint. The presence of the fibrous sillimanite (fibrolite) component is noteworthy and provides evidence of a psammopelitic origin.

CLASSIFICATION: *Quartz plagioclase minor potash feldspar silliamnite original biotite quartzofeldspathic - psammopelitic gneiss, stable under regional amphibolite metamorphic facies and retrogressed to sericite and Fe/Mg chlorite as a syn-tectonic retrograde phase.*



Sample TKRC 100003 214 – 215 m
The quartzofeldspathic gneissic host has been subject to deformation and retrograde alteration. Original platy biotite has been replaced by Fe/Mg chlorite (chl) and plagioclase (pl) has been incipiently sericitised (ser). Fibrous sillimanite (fibrolite – sill) provides evidence for a psammopelitic origin. Minor platy muscovite (mu) parallels the late schistosity. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TKRC 100004 175 – 176 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

SECTION TYPE: Thin Section

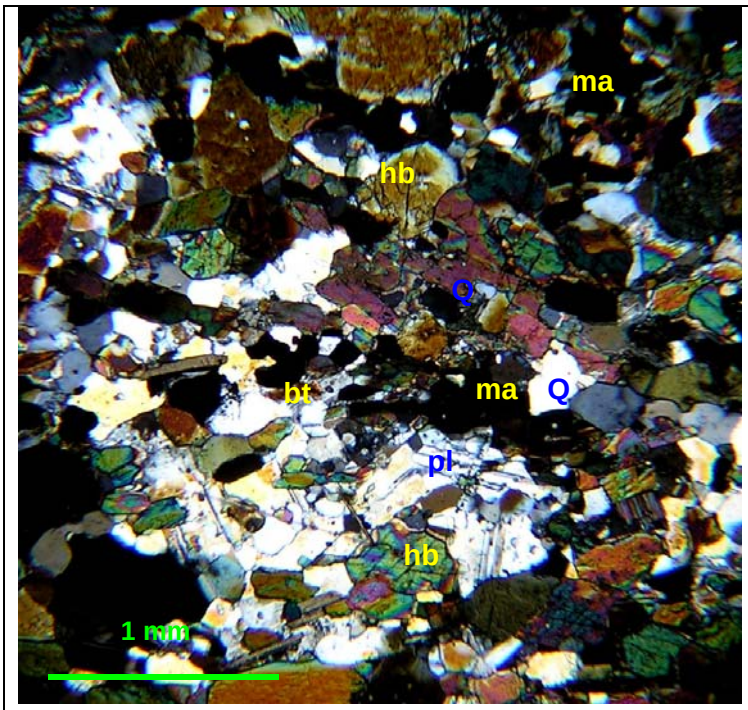
FIELD IDENTIFICATION: Fine grained mafic granulite or amphibolite.

DESCRIPTION: The fine to medium grained, granoblastic assemblage apparent in an amphibolitic chip, comprises subidioblastic green/khaki pleochroic metamorphic hornblende associated with poorly twinned plagioclase and subordinate quartz (8 vol%). Plagioclase has been progressively altered to scaly sericite as retrograde phase. Platy biotite (3 vol%) and subhedral magnetite (2 vol%) form an integral part of the assemblage. Increased platy biotite is apparent in another amphibolitic chip.

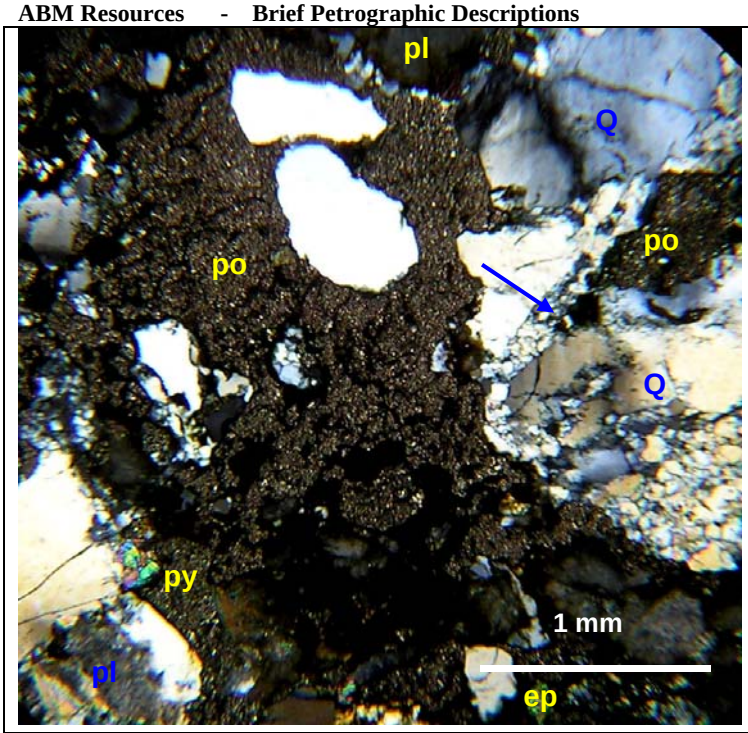
A felsic - pegmatitic(?) chip is dominated by coarse anhedral quartz containing minor platy biotite, locally replaced by Fe/Mg chlorite. The original feldspathic component has been pervasively altered to sericite and clay. Epidote represents a minor alteration phase. There is evidence of localised recrystallisation of quartz. Sulphide stringers (12 vol%) occurring in the siliceous host include pyrrhotite and pyrite.

Comments: The amphibolitic chip represents a prograde, amphibolite facies metamorphosed and metasomatised (quartz, biotite) mafic – possible dolerite dyke. The coarse grained siliceous chip is closely associated with sulphide stringers (pyrite and pyrrhotite) and probably similarly undergone amphibolite facies metamorphism.

CLASSIFICATION: *Quartz plagioclase hornblende biotite amphibole representing a prograde metamorphosed and metasomatised mafic. A coarse grained mineralised (pyrrhotite, pyrite) chip comprises quartz and original feldspar supporting a possible pegmatitic origin(?).*



Sample TKRC 100004 175 – 176 m
The granoblastic assemblage comprises subidioblastic hornblende (hb) associated with plagioclase (pl) and minor quartz (Q). Fine, anhedral magnetite (ma) and platy biotite (bt) represent a minor phase. Crossed polars. Field of view – 3 mm.



Sample TKRC 100004 175 – 176 m
The coarse grained siliceous chips comprise quartz and minor sericitised plagioclase (pl) and may have a pegmatitic origin(?). Quartz has been locally recrystallised (arrowed). Sulphide stringers comprising pyrrhotite (po) and pyrite (py) have penetrated the matrix. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TKRC 100005 249 – 252 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

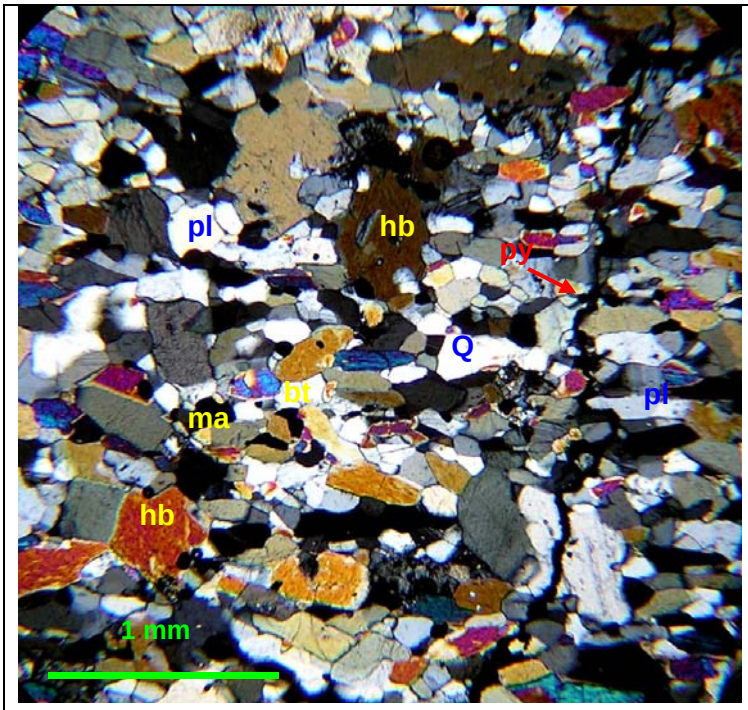
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Fine grained mafic granulite or amphibolite.

DESCRIPTION: The fine to medium grained, granoblastic assemblage comprises xenoblastic and lepidoblastic, pale green/khaki pleochroic metamorphic hornblende associated with poorly twinned plagioclase and subordinate quartz (6 vol%). Coarser grained pale-coloured tremolite/actinolite porphyroblasts are apparent. Clinozoisite probably represents a minor retrograde phase in the matrix. Fine, anhedral magnetite is dispersed through the matrix. Accessory pyrite is associated with altered feldspar and cuts the matrix as a late stylolitic vein.

Comments: The hornblende plagioclase minor quartz clinozoisite amphibolitic assemblage is stable under upper greenschist to amphibolite facies and represent an original mafic to intermediate lithology. Minor sulphides (pyrite) represent a late phase accompanying retrograde alteration.

CLASSIFICATION: *Hornblende plagioclase minor quartz clinozoisite amphibolitic assemblage stable under upper greenschist to amphibolite regional metamorphic facies.*



Sample TKRC 100005 249 – 252 m
The granoblastic assemblage comprises xenoblastic to oriented lepidoblastic hornblende (hb) associated with plagioclase (pl) and minor quartz (Q). Fine, anhedral magnetite (ma) is dispersed through the matrix. Pyrite (py - opaque) has penetrated a stylolitic vein cutting the matrix. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TKRC 100008 204 – 208 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

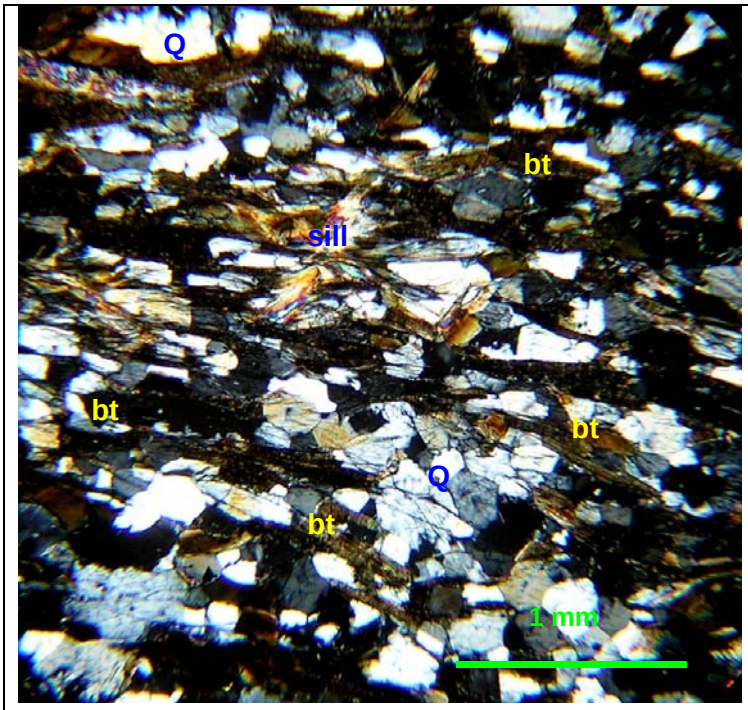
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Biotite muscovite schist.

DESCRIPTION: Broadly similar to Sample TKRC 100002 300 – 302 m, with a well developed gneissic or schistose texture followed by platy biotite associated with fine to medium grained granoblastic quartz. Distinctive muscovite poikiloblasts are apparent and can be associated with anhedral magnetite. Quartz typically contains very fine fibrous sillimanite (or fibrolite) inclusions. Columnar to fibrous sillimanite can occur as clumps in the matrix and is typically oriented parallel to the schistosity. Accessory fine subidioblastic garnet.

Comments: The chip has clearly preserved a schistose texture and, along with the presence of fibrous sillimanite and accessory garnet, suggest a possible psammopelitc precursor that has been regionally metamorphosed under amphibolite facies.

CLASSIFICATION: *Quartz biotite sillimanite minor garnet schist representing an original psammopelite stable under amphibolite metamorphic facies.*



Sample TKRC 100008 204 – 208 m
Platy biotite (bt) and fibrous sillimanite (fibrolite – sill) parallel the schistosity. Granoblastic quartz (Q) occurs interstitially in the quartz biotite sillimanite schistose host. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TARC 100001 108 – 114 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

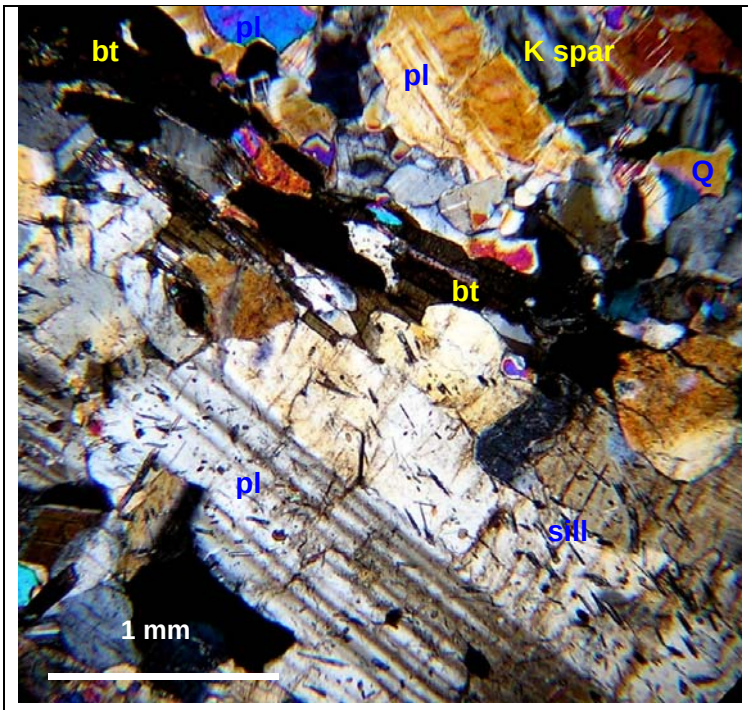
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Felsic, quartzofeldspathic gneiss.

DESCRIPTION: The medium to coarse grained quartzofeldspathic metamorphic assemblage exhibits a granoblastic texture and comprises potash feldspar – microcline associated with quartz (20 vol%) and plagioclase. Coarser grained plagioclase porphyroblasts occur in the matrix and typically contains bundles of fine acicular sillaminite inclusions. Dark platy biotite (5 vol%) represents a minor phase and exhibits a weak gneissosity.

Comments: The quartzofeldspathic matrix lacks relict textures although the presence of unusual plagioclase porphyroblasts containing abundant sillimanite inclusions may indicate that the metamorphic lithology has been reworked or potentially represents a metamorphosed alteration assemblage. The overall composition is stable under regional upper amphibolite metamorphic facies.

CLASSIFICATION: *Quartz microcline plagioclase biotite minor sillimanite metamorphic assemblage stable under regional upper amphibolite metamorphic facies and possibly represnting an original altered(?) felsite.*



Sample TARC 100001 108 – 114 m
The granoblastic quartzofeldspathic assemblage comprises porphyroblastic plagioclase, containing fine acicular sillimanite (sill) inclusions and associated with potash feldspar – microcline (K spar) and minor quartz (Q). Platy biotite parallels a weak gneissosity. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TARC 100001 156 – 157 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

SECTION TYPE: Thin Section

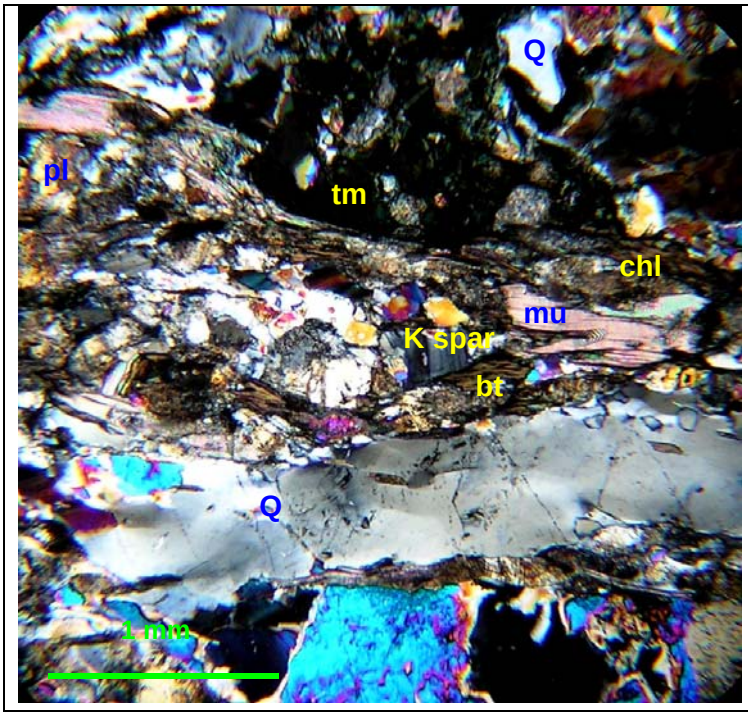
FIELD IDENTIFICATION: Sheared, altered felsic gneiss.

DESCRIPTION: A well developed anastomosing schistosity has been superimposed on a medium to coarse grained quartzofeldspathic prograde metamorphic host. The quartzofeldspathic matrix comprises granoblastic potash feldspar – microcline associated with quartz (40 vol%) and plagioclase. Xenoblastic tourmaline – dravite occurs as an accessory in the host.

Platy biotite, muscovite and Mg/Fe chlorite parallel an anastomosing schistosity and represents a retrograde phase associated with ongoing deformation. Residual leucoxene occurs within chlorite. Plagioclase has been pervasively altered to dusted clays and scaly sericite.

Comments: The quartzofeldspathic host is stable under regional amphibolite facies and has been subject to a deformation – mylonitic overprint. Deformation is associated with a retrograde alteration assemblage including Mg/Fe chlorite and muscovite as well as clay-dusting of the feldspathic component.

CLASSIFICATION: *Quartz microcline plagioclase biotite prograde quartzofeldspathic metamorphic assemblage stable under regional amphibolite metamorphic facies that has been subject to mylonitisation and retrograde alteration (Mg/Fe chlorite, muscovite, clay – dusting).*



Sample TARC 100001 156 – 157 m
The granoblastic quartzofeldspathic prograde metamorphic host comprising potash feldspar – microcline (K spar), quartz (Q) and plagioclase (pl) has been subject to mylonitisation. Platy muscovite (mu), Mg/Fe chlorite (chl) and biotite (bt) parallel an anastomosing schistosity. Plagioclase has been clay dusted. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TARC 100003 75 – 90 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

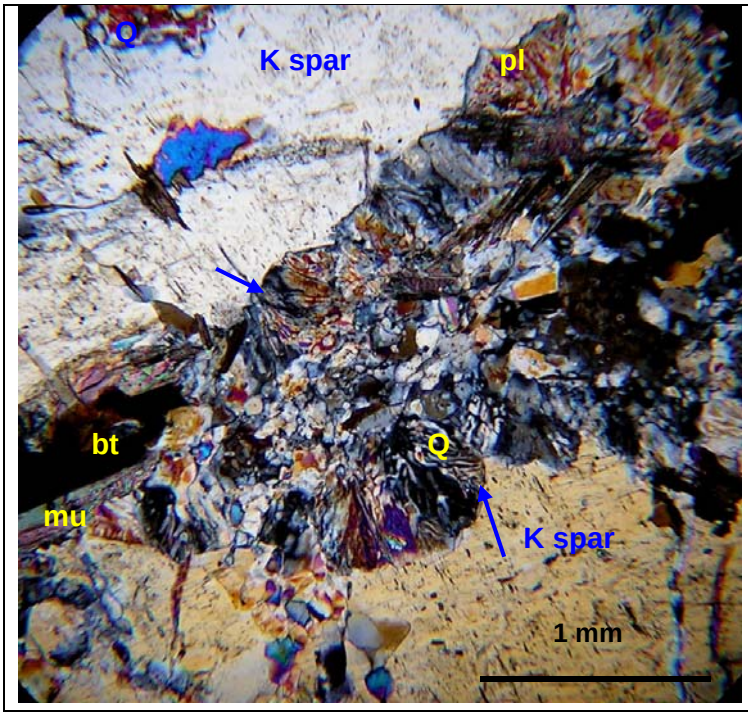
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Coarse grained granite, granite gneiss or possible migmatite.

DESCRIPTION: Broadly similar to Sample TKRC 100002 300 – 302 m and dominated by potash feldspar - microcline (75 vol%), typically occurring as coarse megacrysts (up to 1.4 cm) in a fine to medium grained matrix. The matrix exhibits an allotriomorphic granular texture with an anhedral mosaic of microcline associated with quartz (10 vol%) and plagioclase. Plagioclase can exhibit distinctive feathery granophyric textures (with quartz) in contact with the microcline megacrysts. Platy biotite and muscovite occur as minor phases in the matrix.

Comments: The evidence provided by the thin section with the presence of coarse potash feldspar megacrysts as well as feathery granophyric textures suggest an intrusive origin for the lithology that can be classified as a syenogranite. The intrusive could have a anatectic origin in the high grade quartzofeldspthic metamorphic terrain.

CLASSIFICATION: *Syenogranite containing potash feldspar – microcline megacrysts and possibly having a anatectic origin.*



Sample TARC 100003 75 – 90 m
Coarse potash feldspar – microcline megacrsyst associated with plagioclase exhibiting distinctive feathery granophyric textures with minor quartz (arrowed). Platy biotite (bt) and muscovite (mu) occur in the matrix. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: TARC 100004 207 – 210 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

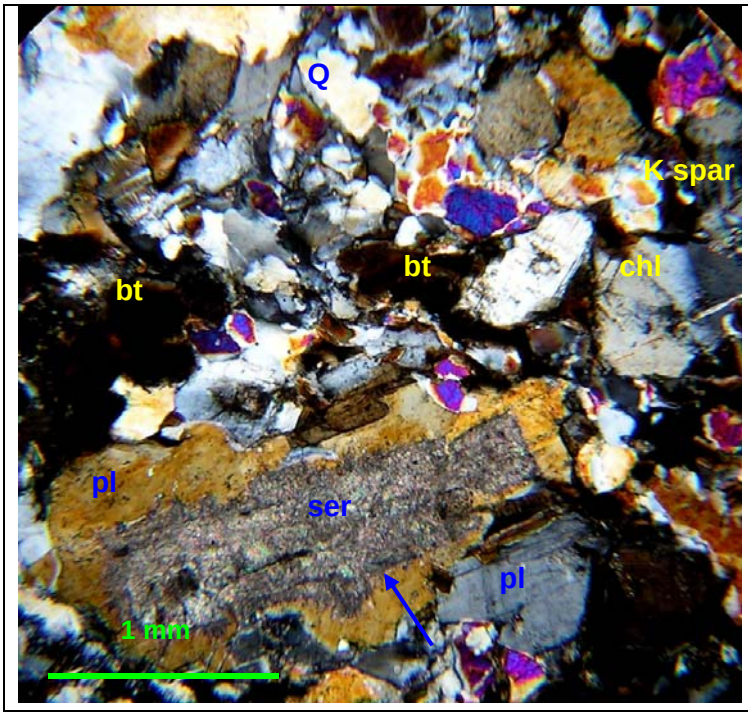
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Granite gneiss.

DESCRIPTION: The fine to medium grained quartzofeldspathic assemblage exhibits conflicting textures that suggest an anatectic origin for the lithology. The matrix generally exhibits an allotriomorphic granular texture and comprises anhedral plagioclase (45 vol%) associated with potash feldspar – orthoclase (20 vol%) and quartz. Platy biotite (6 vol%) occurs as an interstitial phase. Biotite can follow a weak orientation (gneissosity) in some portions of the matrix. Plagioclase can exhibit compositional zoning and has locally developed fine granophyric textures with quartz. There is evidence of sericitised lathlike plagioclase cores rimmed by secondary plagioclase. Fine tabular apatite occurs as an accessory.

Comments: The composition of the quartzofeldspathic lithology favours an intrusive origin although anatactectic melting of a gneissic host is feasible. The texture and composition classifies the lithology as a microgranite. The presence of a sericitised plagioclase core and feathery granophyric textures suggest metasomatic processes during petrogenesis.

CLASSIFICATION: *Quartzofeldspathic assemblage identified as a microgranite that may be a product of anatectic melting of a felsic gneiss host. The assemblage has been subject to metasomatism.*



Sample TARC 100004 207 – 210 m
The quartzofeldspathic assemblage exhibits an allotriomorphic granular texture and comprises anhedral plagioclase (pl) associated with potash feldspar – orthoclase (K spar) and quartz (Q). Platy biotite (bt) occurs interstitially. Plagioclase has been sericitised (ser) and rimmed by secondary plagioclase as a product of metasomatism (arrowed). Crossed polars. Field of view – 3 mm.

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SAMPLE NO: MARC 100001 265 – 266 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

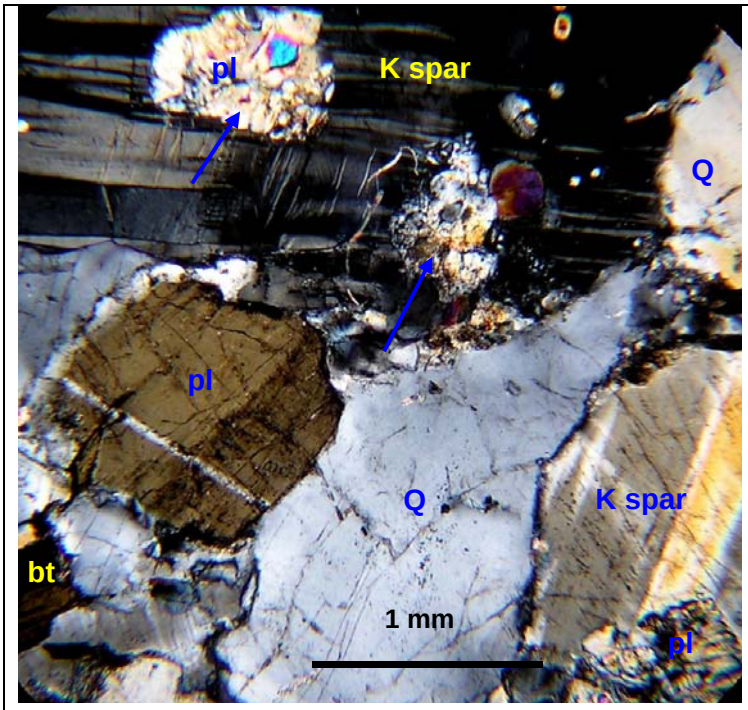
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Quartzofeldspathic gneiss.

DESCRIPTION: The medium to coarse grained assemblage tends to an allotriomorphic granular texture suggesting an intrusive origin although the presence of oriented biotite also suggests metamorphic affinities. The conflicting textures include evidence of relict plagioclase that has been enveloped by potash feldspar – microcline and quartz with the concomitant development of granophyric textures. Oriented platy biotite would appear to form part of the metamorphic protolith.

Comments: The quartzofeldspathic matrix demonstrates both metamorphic and intrusive textures. The introduction of potash feldspar and quartz, and the development of granophyric textures is consistent with granitisation of the metamorphic host due to anatectic or metasomatic processes.

CLASSIFICATION: *Quartz microcline plagioclase biotite assemblage identified as a granite that may be a product of anatectic melting/metasomatic replacement of a felsic gneiss host.*



Sample MARC 100001 265 – 266 m
Plagioclase (pl) represents a relict phase and has locally developed granophyric textures (arrowed). Quartz and potash feldspar – microcline has enveloped relict phases during a process of granitisation or anatectic/metasomatic processes. Crossed polars. Field of view – 3 mm.

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SAMPLE NO: MARC 100003 213 – 214 m **LOCATION:**

SAMPLE TYPE: Percussion Chips

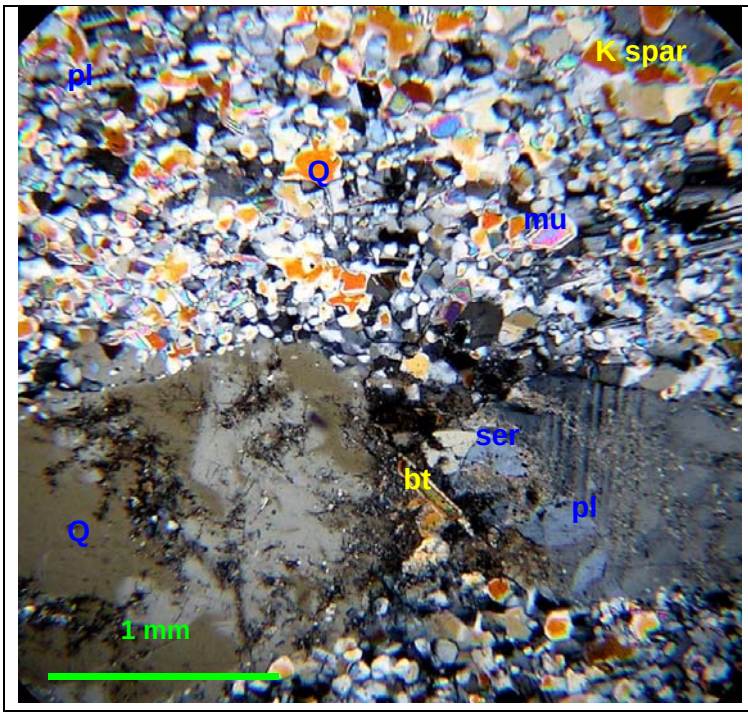
SECTION TYPE: Thin Section

FIELD IDENTIFICATION: Felsic schist.

DESCRIPTION: Medium to coarse grained quartz and plagioclase porphyroblasts occur in a fine grained foliated matrix. The porphyrobalsts include recrystallised quartz (up to 8 mm) that can be rimmed by oriented platy Fe/Mg chlorite, and plagioclase – oligoclase, that contain platy biotite and muscovite inclusions. The matrix exhibits a fine grained granoblastic and poikiloblastic texture and comprises fine platy muscovite, xenoblastic quartz in a poikiloblastic feldspathic matrix that includes plagioclase and subordinate potash feldspar – microcline.

Comments: The quartz and plagioclase porphyroblasts would appear to reflect original phenocrysts in a fine grained matrix and suggest a felsic porphyry protolith. The felsic matrix has been recrystallised during prograde metamorphism. The preservation of relict porphyritic textures suggest an upper greenschist to lower amphibolite metamorphic regime.

CLASSIFICATION: *Relict quartz and plagioclase phenocrysts are now represented by porphyroblasts in the recrystallised – metamorphosed quartz – muscovite – feldspar matrix and suggest an original felsic porphyry.*



Sample MARC 100003 213 – 214 m
Quartz (Q) and plagioclase (pl) porphyroblasts in a prograde metamorphosed felsic porphyry. Platy muscovite (mu) and xenoblastic quartz (Q) occur in the recrystallised matrix. Crossed polars. Field of view – 3 mm.

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