Appendix D. Kiggavik Rock Sample Hand Specimen and Thin Section Petrology

The bedrock sampling and processing rationale and methodology are outlined in the Introduction of this Open File. This Appendix provides systematic petrographic descriptions of thin sections and polished thin sections for 36 samples (Table D-1) as they appear under transmitted and reflected light. Two samples that were deemed important are also described from hand specimen data only (samples 10-PTA-R047 and –R059, denoted with *italic*s* in Table D-1). These descriptions are greatly modified after Appendix M of Scott (2015), especially the rock type and unit designations, based on new contextual knowledge and review of primary data by C. Jefferson. Some mineralogical knowledge from SEM and EMPA analyses (Appendix G) is integrated into the tables and descriptions. As noted in the main portion of this report, the purpose of examining these 38 samples more closely is to understand the potential metallic, oxide, and silicate indicator mineral signatures (i.e. abundance, size distribution, mineral chemistry) of the exposed Kiggavik discovery outcrop and Kiggavik Main Zone (KMZ) uranium deposit, as well as the associated alteration within and around some of the other prospects in the Kiggavik Camp. For each mineral species, this Appendix provides information on its relative concentrations and textures in the main rock types and its interpreted potential for transport in till away from the deposit site.

Table D-1. List of 38 samples described in this appendix. **Hand specimen description only*.

10-PTA-R005	10-PTA-R046	*10-PTA-R059**	10-PTA-R141
10-PTA-R009A	*10-PTA-R047**	10-PTA-R060	10-PTA-R142
10-PTA-R012	10-PTA-R048	10-PTA-R063	10-PTA-R143
10-PTA-R018	10-PTA-R050	10-PTA-R064	10-PTA-R144
10-PTA-R020	10-PTA-R051	10-PTA-R065	10-PTA-R145
10-PTA-R026A	10-PTA-R053	10-PTR-R072A	
10-PTA-R032	10-PTA-R054	10-PTA-R072B	
10-PTA-R040	10-PTA-R055	10-PTA-R073	
10-PTA-R041	10-PTA-R056	10-PTA-R138	
10-PTA-R044	10-PTA-R057	10-PTA-R139	
10-PTA-R045	10-PTA-R058	10-PTA-R140	

Uranium-enriched, low-uranium but altered, and non-mineralized samples are described below for 10 rock types. Of greatest interest is the mineralogy of the metagreywacke that is the main host of the Kiggavik deposits. This has been assigned to the Pipedream assemblage of the Woodburn Lake group (Perhsson et al., 2010, 2013) and is hereafter referred to simply as metagreywacke. Generally, in the samples containing little to no uranium oxide minerals, the dominant phases are quartz, muscovite, biotite, and altered feldspar. These are typically enclosed

by a matrix of clay minerals. This metagreywacke underwent metamorphism to upper greenschist or lowermost amphibolite prior to localized hydrothermal alteration (illitization, de-quartzification, hematitization) around the uranium deposits. In uranium-rich samples, the original textures are relict to destroyed, and the mineralogy is completely altered. Uraninite and coffinite are the two dominant U oxide minerals and rarely exceed 200 μm in size. Samples 10-PTA-R063 and -R064 are the only samples that contain U minerals in high concentrations. Galena is also present in samples that contain uranium minerals, however it's grain size is commonly in the range of 50 to 75 μm. Only one sample (10-PTA-R046) was observed to have a galena grain with a diameter greater than 150 μm.

The metagreywacke samples from the Kiggavik camp (fresh, altered, and uraniferous) share a common mineralogical composition. In less-altered samples, quartz, feldspar, and muscovite / sericite are the dominant minerals. Quartz in particular has a bimodal grain size, such that larger (>200 μm) pre-tectonic "quartz eyes" are wrapped by fine-grained (<50 μm) mica and quartz. Other than this assemblage of silicate minerals, the metagreywacke also contain a range of accessory minerals, which are listed in Table D-2:

Table D-2. Minerals of main rock types in the Kiggavik camp, their modes in metagreywacke, and codes used to label photomicrographs. The lower part of the table focuses on accessory minerals in metagreywacke, listed in decreasing order of abundance.

Framework minerals found in all main rock types	**Median grain size in metagreywacke (μm)**	**Label on photo-micrographs**
Quartz	150	Q
Alkaline Feldspar	150	K
Plagioclase Feldspar	200	P
Muscovite / Sericite	100	M
Biotite	100	Bt
Clay Alteration	<25	CA
Chlorite	100	CL
Hematite	50	H
Hornblende	N/A	Hbl
Clinopyroxene	N/A	Cpx
Accessory minerals in metagreywacke	**Median grain size in metagreywacke (μm)**	
Uraninite	75	U
Coffinite	50	Co
Rutile	50	R
Fluorapatite	50	A
Pyrite	40	Py
Magnetite	N/A	Mt
Goethite / Limonite (altered hematite)	25	Gt
Titanite	75	Ti

Chalcopyrite	<25	Cpy
Fluorite	100	Fl
Zircon	50	Z
Monzonite	25	only in SEM
Barite	150	only in SEM
Galena	75	Gn
Molybdenite	N/A	Mo

Many of the minerals listed in Table D-2 were documented only by SEM as they are very fine-grained and thus difficult to distinguish in either transmitted light or reflected light. Further work using the microprobe and SEM are needed to fully and quantitatively develop an indicator mineral suite for this deposit and to develop a predicted geochemical representation of such a suite. Several other rock types were sampled and described in detail for complete understanding of potential mineralogical sources for till. The Hudson Granite and Martell Syenite crop out in the area of the KMZ. These are common and non-distinctive plutonic country rocks within the study region and tend not to host hydrothermal uranium minerals; however it is important to be comprehensive in this petrological characterization. Although the Nueltin Granite is considered by some to be a key metallotect for the Kiggavik style of deposit and is partial host to the KMZ (Scott et al., 2015), it is not exposed around the KMZ and crops out in only a few small places in the Kiggavik camp, such as at Andrew Lake (Fig. 3 of main report) and a newly reported outcrop of chert-veined, gold-bearing granite discovered by this study (Sample 10PTA-R047). However when this study was initiated, the distinction between the Nueltin and Hudson igneous suites was poorly known, especially for the granitoid phases, and even now the petrographic distinction is extremely subtle, therefore again it is important for completeness to characterize the minerolgy of the Lone Gull plug objectively due to its potential contribution to the till composition. Finally, and equally important, several samples of the Thelon Formation sandstone and conglomerate were collected from outcrop. These are described here in detail because this unit underlies much of the northwestern part of the till sample area and is a known contributor to till derived from the Baker Lake Basin (McMartin et al., 2006).

The following abbreviations are used in the rock descriptions:
KMZ = Kiggavik Main Zone
PPL = Plain Polarized LightRL = Reflected Light
XPL = Cross Polarized Light
Mineral label codes are explained in Table D-2.

Sample 10-PTA-R005

Rock name: Metagreywacke: hematitized, highly foliated / mylonitized, and fine-grained.
Map unit: Brecciated deep, red fault zone with steeply north-dipping foliation.
Field relationships: Outcrop of brecciated, reactivated fault zone (photographs in Appendix B.1), part of the Judge Sissons Fault immediately east of the End Grid deposit, mapped as cutting Woodburn Lake group by Hadlari et al. (2004).
Sample description: Reddish orange**,** fractured, and altered feldspathic metagreywacke transected by quartz veinlets.
Texture: Fractured, highly foliated, fine to very fine grained, with highly flattened polygonized quartz grains cut by multiple generations of quartz and clay alteration veinlets.
Mineralogy

45% Quartz: <25 μm – 2 mm (median = 200 μm); anhedral, flattened, and elongated (D_1 deformation). Multiple generations of quartz veins that range from coarse, 2–5 mm thick with drusy quartz to 1–2 mm and highly altered containing hematitized clay minerals.

28% Clay alteration: <25 μm; replaces all primary minerals excluding quartz. Much of the clay appears to be either hematitized or intimately mixed with hematite (sample is red and much of the clay alteration matrix is black when viewed in plane polarized light in thin section).

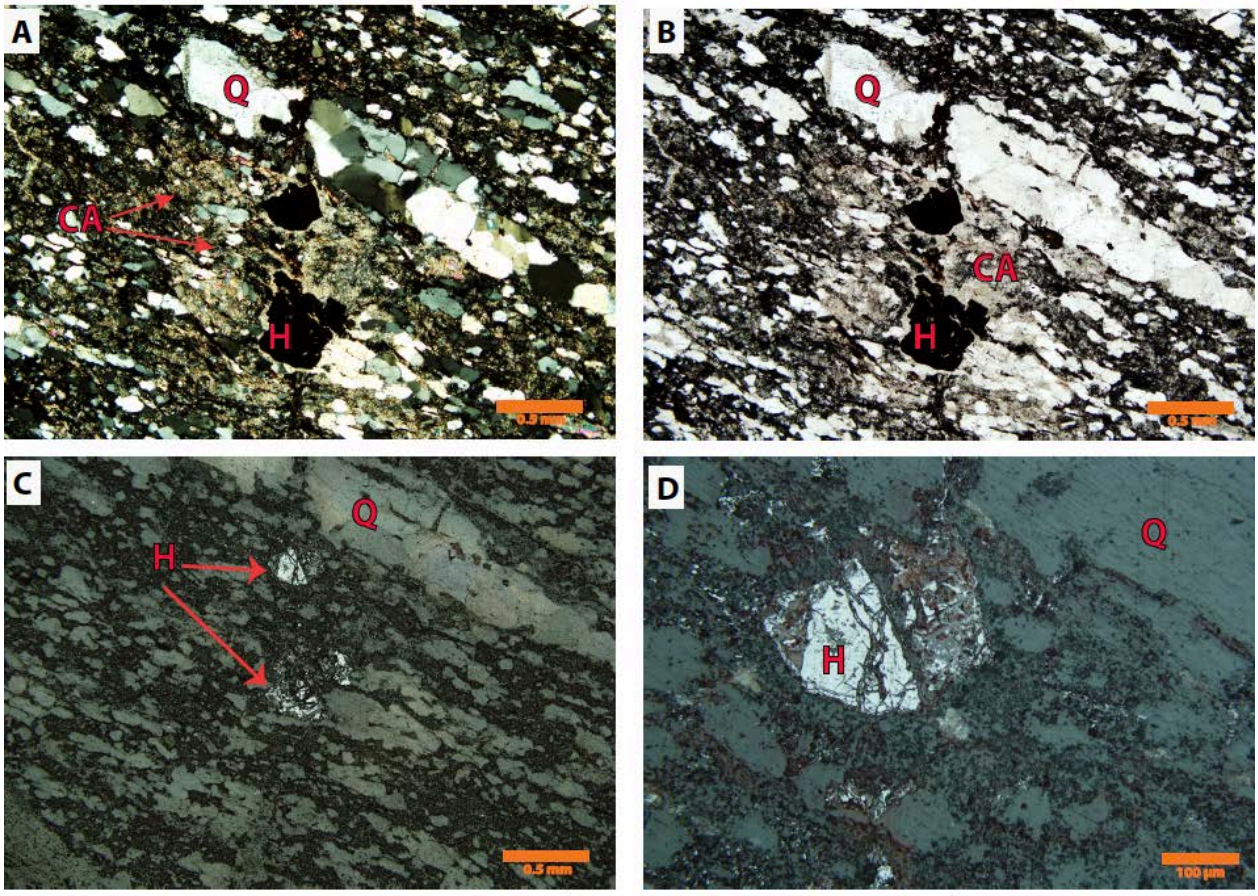
15% Hematite alteration: <25 μm; See description of clay alteration.

5% Feldspar (relict): ~100 μm – 1 mm: All grains have been replaced by clay and hematite alteration minerals; this percentage reflects only those grains that are preserved well enough for textural identification.

5% Muscovite / Sericite: 25 μm – 200 μm: (median is 150 μm). Subhedral; mainly an alteration product within feldspar grains.

2% Hematite: <25 μm – 300 μm (median is 100 μm). Anhedral – subhedral; appears to predominantly replace detrital heavy mineral grains.

Additional Comments: This sample was highly sheared and fractured before and during hydrothermal alteration as indicated by the clay, hematite, and multiple quartz veins. Its brick red colour is due to the high degree of hydrothermal hematite alteration along the reactivated Thelon Fault.



10-PTA-R005 Images: (a) 5x Mag – XPL (b) 5x Mag – PPL (c) 5x Mag – RL (d) 20x Mag - RL

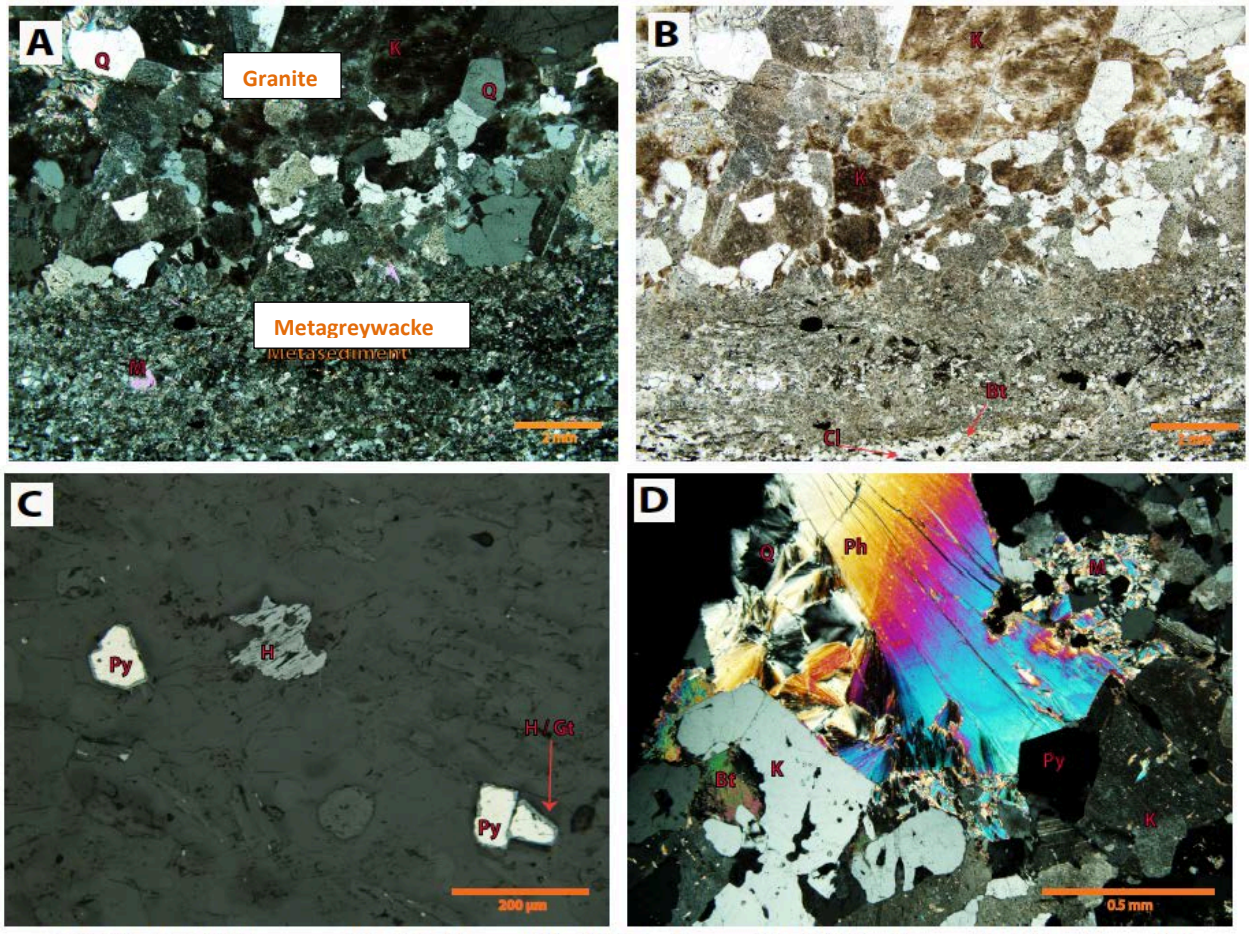
10-PTA-R009A

Rock name: Metagreywacke cut by a thin granite sill.
Map units: Pipedream assemblage and Hudson Granite.
Field relationships: Overall low, flat outcrop located above part of the Main Zone uranium deposit, immediately south of the discovery showing at Kiggavik. The sample was taken at the contact between one of a series of 10 to 30 cm subhorizontal granite sills that dip gently to the north and are subparallel to foliation in the metagreywacke (see photographs in Appendix B.2). The metagreywacke is the main rock type of this outcrop. This sample illustrates sill-like aphophyses at the irregular, unchilled contact between the 1.83 Ga Hudson Granite sheet and the metagreywacke. The sedimentary bedding has been transposed subparallel to the foliation. The following two rock types were not sampled for this study. Close to the eastern edge of the outcrop, a 025°-trending, steeply dipping bostonite dyke (intrusive equivalent of the Christopher Island Formation) cuts both rock types (see Scott et al., 2015). A near-vertical 170° dyke of mixed granitic pegmatite and aplite demarks the west side of the outcrop.
Sample description: Dark to light grey metagreywacke with blebs of pink feldspar is in sharp contact with a granite sill that is oriented slightly oblique to the foliation.
Textures: The margin of a fine- to medium-grained, equigranular, undeformed granite sill (top of photomicrographs A and B) cuts at a very low angle across foliation and transposed lamination in a fine-grained, well foliated metasedimentary rock. The granite is not chilled against the metagreywacke, which is consistent with a mid-crustal level of emplacement.
Mineralogy:

- **30% Alkaline Feldspar:** 10–200 μm in metagreywacke (anhedral and altered). 100–2 mm (median is 500 μm) in the granite. Weakly altered to sericite; subhedral in the granite.
- **25 % Quartz:** Well sorted, 10–200 μm (median is 50 μm). The anhedral, sutured, flattened shapes and recrystallized grain reduction record significant strain in the main part of the metagreywacke followed by annealing during upper greenschist metamorphism, which was coincident with the intrusion of Hudson Granite. Slightly less abundant in metagreywacke than in granite.
- **15% Plagioclase:** 100–5 mm, (median is 1 mm). Subhedral to euhedral; interlocking texture. Some grains are altered (kaolinite).
- **20% Biotite:** Mainly in metagreywacke, a few grains ~200 μm interstitial in granite. 50–300 μm. (median = 100 μm). Subhedral to euhedral, brown to dark brown in PPL, orangey brown to green in XPL. Commonly forms radiating clusters.
- **7% Chlorite: ~**50–300 μm (median is 100 μm). Subhedral, felted clusters. Occurs solely in metasediment away from contact
- **<1% Fluorite:** ~200 μm, purplish in PPL (only one grain found in granite).
- **<1%Fluorapatite:** ~300 μm (found in granite). Euhedral, hexagonal, greenish yellow in XPL.
- **2% Muscovite:** ~50–200 μm; (occurs very close to the contact with granite in the metagreywacke alongside clay alteration minerals).
- **1% Hematite?:** <25–200 μm. (median is 75 μm) Reddish in PPL (internal reflection / alteration) concentrated along contact and disseminated throughout metagreywacke. Could include some limonite
- **1% Pyrite:??** <25–300 μm. (median is 100 μm) Subhedral to anhedral. Disseminated in metagreywacke and concentrated along the intrusive granite contact. Some grains are

rimmed by either hematite or goethite, which is presumed to be the reddish brown to brown mineral along the granite-metagreywacke contact.

Additional Comments: Phyllosilicate mineralogy in the metagreywacke varies with distance from the contact zone. Muscovite is dominate adjacent to the contact, then chlorite, and biotite is the most distal.



10-PTA-R009(a) Images: (A) 2.5x Mag – XPL (B) 2.5x Mag – PPL (C) 20x Mag – RL (D) 5x Mag - XPL

10-PTA-R012

Rock name: Rhyolite: quartz-feldspar porphyritic, highly strained. Colloquially this has been termed “quartz-eye quartzite”.

Map unit: Pukiq Lake Formation, Snow Island Suite (2.6 Ga), forms key stratigraphic marker between the Neoarchean metagreywacke and Paleoproterozoic Ketyet River group quartzite.

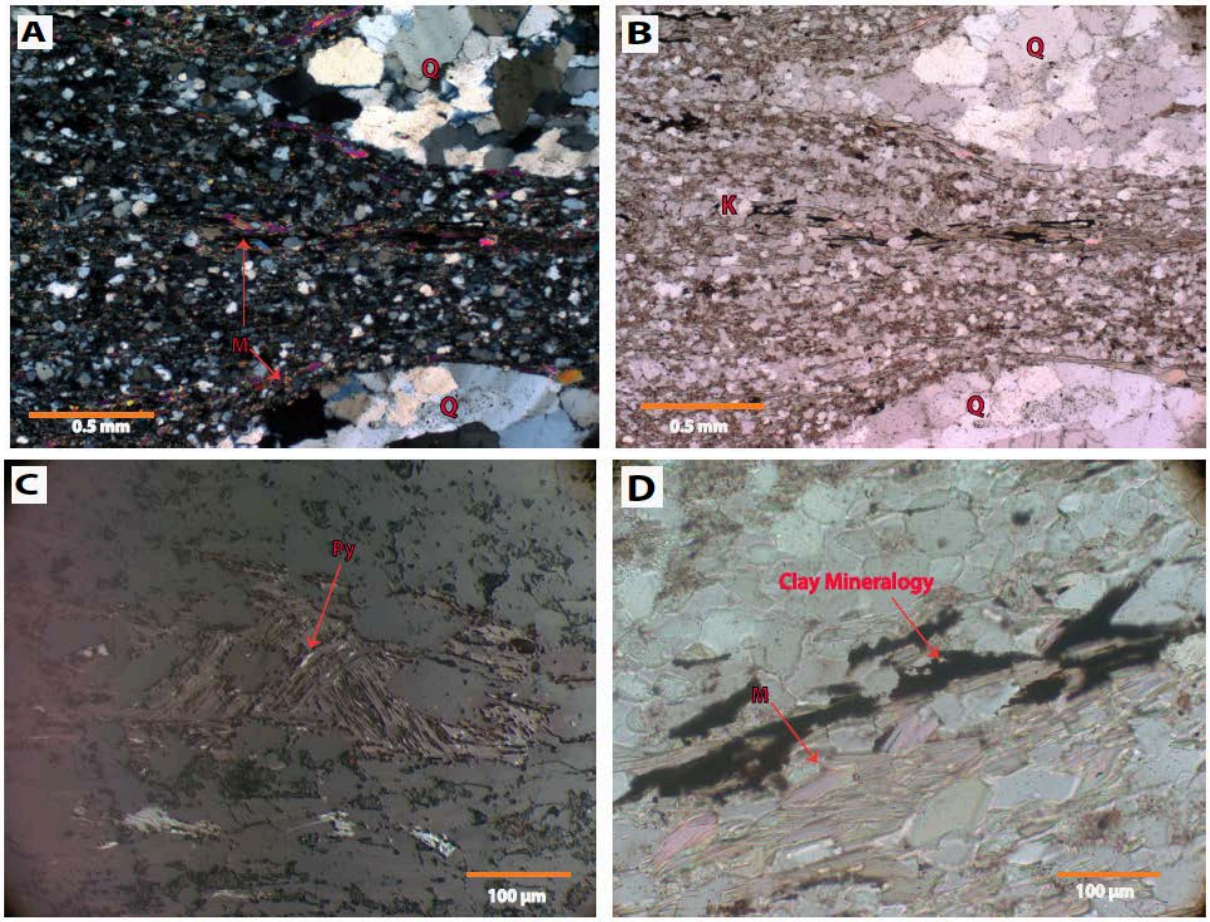
Field relationships: Same outcrop as sample 10-JPM-020 and 10-JPM-095; rhyolite is structurally intercalated with gently northwest-dipping panels of quartzite and poorly exposed metagreywacke across more than 1.3 km (new bedrock mapping, Fig. 3). Photographs of drill core are in Appendix B.3.

Sample description: Light pink to white, potassic feldspar and quartz-eye-bearing micaceous aphanitic rhyolite that has a strong foliation, weak metamorphism, and displays thin mylonitic layering that wraps around pretectonic phenocrysts.

Texture: Anhedral to subhedral; highly foliated, very finely crystalline to aphanitic with phenocrysts of quartz and feldspar that isenveloped by muscovite in addition to finer quartz grains. The quartz and mica are segregated in to metamorphic-structural foliation laminae.

Mineralogy:

- **50 % Quartz:** 50 μm – 5 mm (median 0.2 mm): lensoid, anhedral. Larger phenocrysts are elongated due to deformation. Also these large grains have been polygonized by deformational grain recrystallization into a mosaic of smaller crystals ~1.5 mm. The large phenocrysts have smaller quartz / K-feldspar and mica laminae bent around them. Smaller grains are also elongate parallel to foliation along with the K-feldspar.
- **20% K-feldspar:** <50 μm – 2 mm (median = 200 μm). Anhedral – subhedral. Large phenocrysts are weakly clay altered. Quartz grains truncate the larger feldspar phenocrysts and even wrap around them (K-feldspar grains are pretectonic). Larger phenocrysts are elongated and have lost their crystal form. Smaller grains are even more rounded and flattened into foliation planes along with the finely crystalline quartz.
- **17 % Muscovite:** <25 μm – 0.5 mm, (median 200 μm) Subhedral - euhedral. Forms tectonic laminae interlayered between quartz-and K-feldspardominated laminae; weakly pleochroic.
- **10% Clay minerals:** <25 μm, very finely crystalline felted; occurs as alteration patches in K-feldspar and forms much of the matrix.
- **2% Biotite:** 75 μm – 1 mm (median = 100 μm) Occurs with muscovite and has very similar properties, however it is commonly opaque, possibly due to hematite alteration.
- **1% Pyrite:** <50 μm, anhedral, disseminated, and preferentially associated with the biotite / possibly molybdenite.



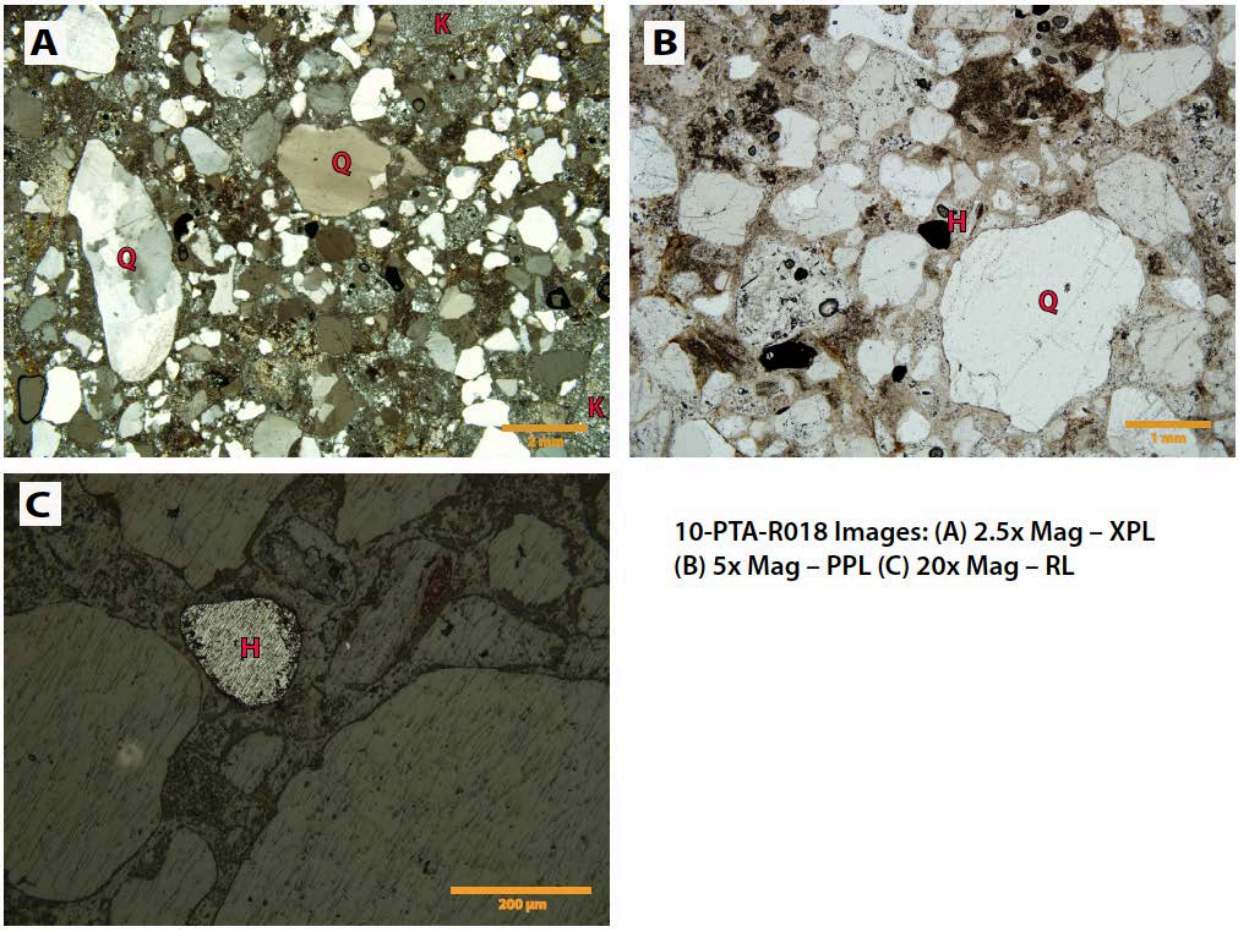
10-PTA-Qtzeye Images: (A) 5x Mag – XPL (B) 5x Mag – PPL (C) 20x Mag – RL (D) 20x Mag - PPL

10-PTA-R018

Rock name: Litharenite: hematitized, clay-altered, feldspathic. **Map unit:** Thelon Formation
Field relationships: Flat-lying sandstone outcrop north of the Thelon Fault and west of Squiggle lake (informal name). Photographs of outcrop and hand specimens are in Appendix B.4.
Sample description: Pale tan overall with reddish orange–brown patches. Hematitized, highly clay altered, poorly sorted, moderately lithified quartzose sandstone.
Texture: Poorly sorted, moderately to well rounded, framework supported.
Framework mineralogy:

68% Quartz: 100 μm – 5 mm: (median 500 μm): Anhedral, subangular to subrounded.
15% Lithic grains: 100 μm – 5 mm: (median 500 μm): Anhedral, subangular to subrounded. Completely altered to clay and hematite.
15% Feldspar: 100 μm – 3 mm: (median 500 μm): Some grains are still intact, and are typically subhedral, however most are pseudomorphed by clay minerals.
2**% Hematite grains:** 50–400 μm (median is 200 μm): Disseminated subhedral, subrounded grains. Could also possibly be limonite?

Matrix mineralogy: Comprises ~35% of the sample. Minerals are unidentified clay species, with some having an opaque hematite coating.



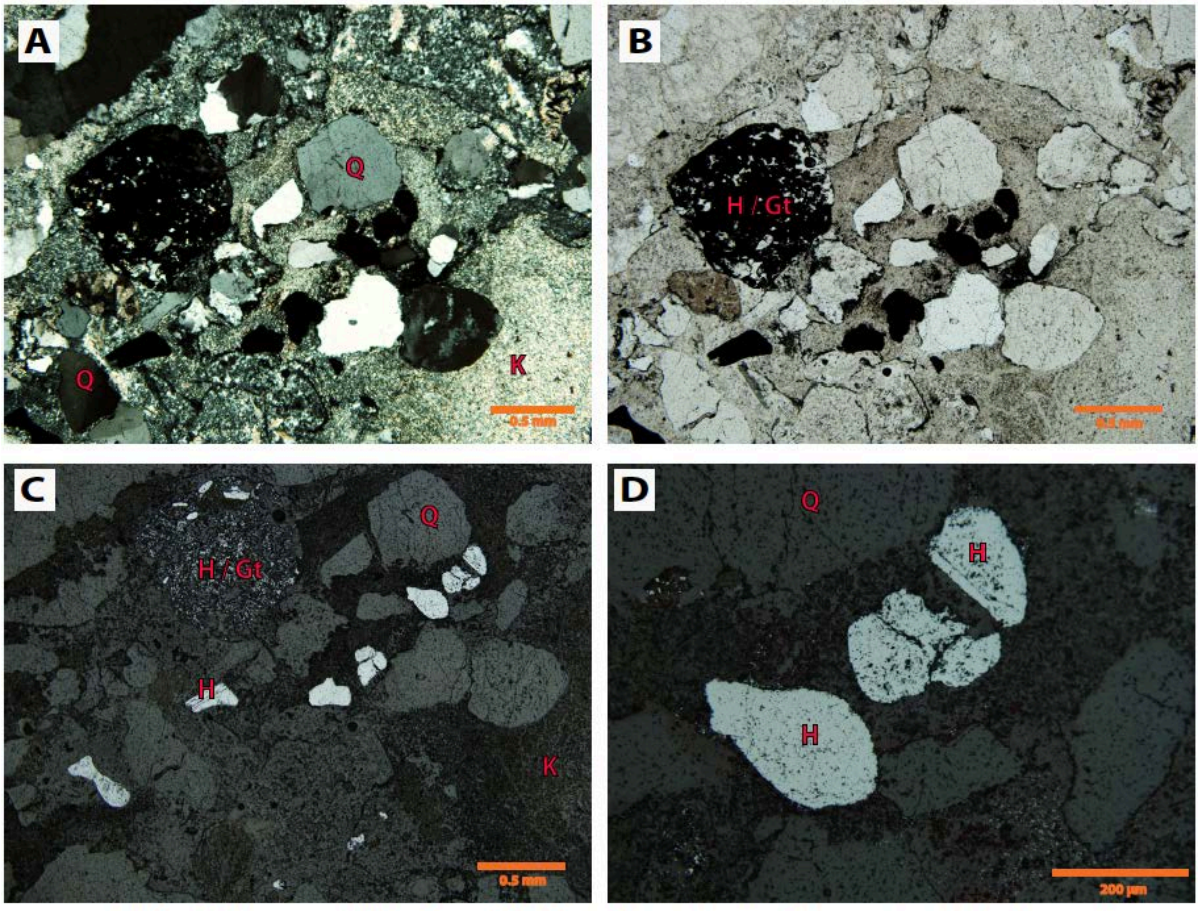
10-PTA-R018 Images: (A) 2.5x Mag – XPL (B) 5x Mag – PPL (C) 20x Mag – RL

10-PTA-R020

Rock name: Litharenite: hematitized, clay-altered, feldspathic, quartz pebbly.
Map unit: Thelon Formation, Barrensland Group, Dubawnt Supergroup.
Field relationships: Flat-lying sandstone outcrop north of the Thelon Fault and southwest of Squiggle lake (informal name) about 1.2 km west of the unconformity between the Thelon Formation and the basement Schultz Lake Intrusive Complex. Photographs of hand specimen and outcrop are in Appendix B.5.
Sample description: Reddish-brown to brown, heavily hematitized quartz arenite with a few pebble clasts.
Texture: Poorly sorted, subangular to subrounded, matrix supported. Large quartz pebbles are dispersed in sandstone.
Framework mineralogy:

- **90% Quartz:** 50 µm – 8 mm (median = 600 µm). Subangular to subrounded, randomly oriented.
- **7% Pseudomorphs feldspar:** 100 µm – 1 mm (median = 400 µm). Subrounded, heavily altered to clay minerals.
- **3% Hematite:** <25–600 µm. Subangular, disseminated.
- **<1% Goethite:** Rims some hematite grains.

Matrix mineralogy: Composed predominantly of very fine-grained quartz and some micaceous minerals. Hematite cement is dominant and coats many quartz grains.



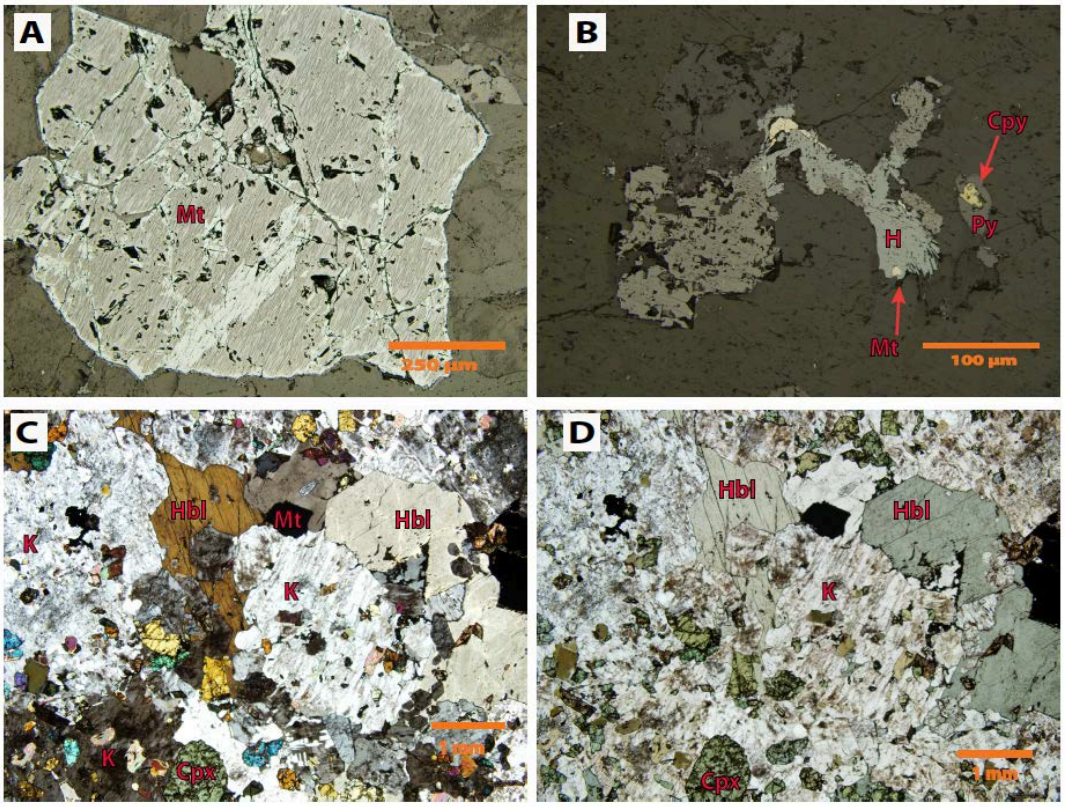
10-PTA-R020 Images: (A) 5x Mag – XPL (B) 5x Mag – PPL (C) 5x Mag – RL (D) 20x Mag – RL

10-PTA-R026A

Rock name: Syenite, mafic.
Map unit: Martell Syenite
Field relationships: Rotated block found amongst felsenmere and outcrop of Hudson Granite in the Schultz Lake Intrusive Complex about 13.6 km west of Kiggavik. Field relationships are complex and intermingled between this syenite and the Hudson Granite. Photograph of hand specimen in Appendix B shows the mafic syenite composition; outcrop photograph shows mafic syenite as the low, rounded, dark-coloured outcrop; large, light-coloured block above hammer is proximally transported Hudson Granite.
Sample description: Dark pink, massive, and moderately magnetic, porphyritic intrusive rock.
Texture: Medium-grained crystalline equigranular with subtle preferred alignment of mafic minerals.
Mineralogy:

30% K-feldspar: 200 μm – 3 mm (median is 1.5 mm). Subhedral, inclusions are very common.
20 % Hornblende: 100 μm – 4 mm (median = 1 mm). Subhedral to euhedral. Blocky, distinct 124-56 cleavage.
15% Plagioclase: 100 μm – 2 mm (median = 500 μm). Subhedral. Inclusions are common.
10% Biotite: 200–500 μm (median = 250 μm). Subhedral, elongated. Some grains could be phlogopite.

15% Clinopyroxene (diopside) 3–8 mm, blocky, green phenocrysts.
5% Quartz: 50–500 μm (median = 200 μm) Anhedral, commonly occurs interstitially.
1% Magnetite: 50 μm – 1 mm (median is 100 μm), Subhedral to euhedral, blocky. Minor pyrite. Partly altered to hematite.
1% Hematite: <50 μm – 0.75 mm (median is 100 μm). Anhedral to bladed. Appears to be a secondary feature replacing magnetite and pyrite; may have the appearance of specular hematite in hand specimen.
1% Pyrite: <25–100 μm. (median = 30 μm) Anhedral to subhedral, very finely disseminated, thin concentrations along hematite boundaries.
1% Fluorapatite: 50–400 μm (median = 100 μm) Subhedral.
<1% Chalcopyrite: <100 μm, very few grains, disseminated.

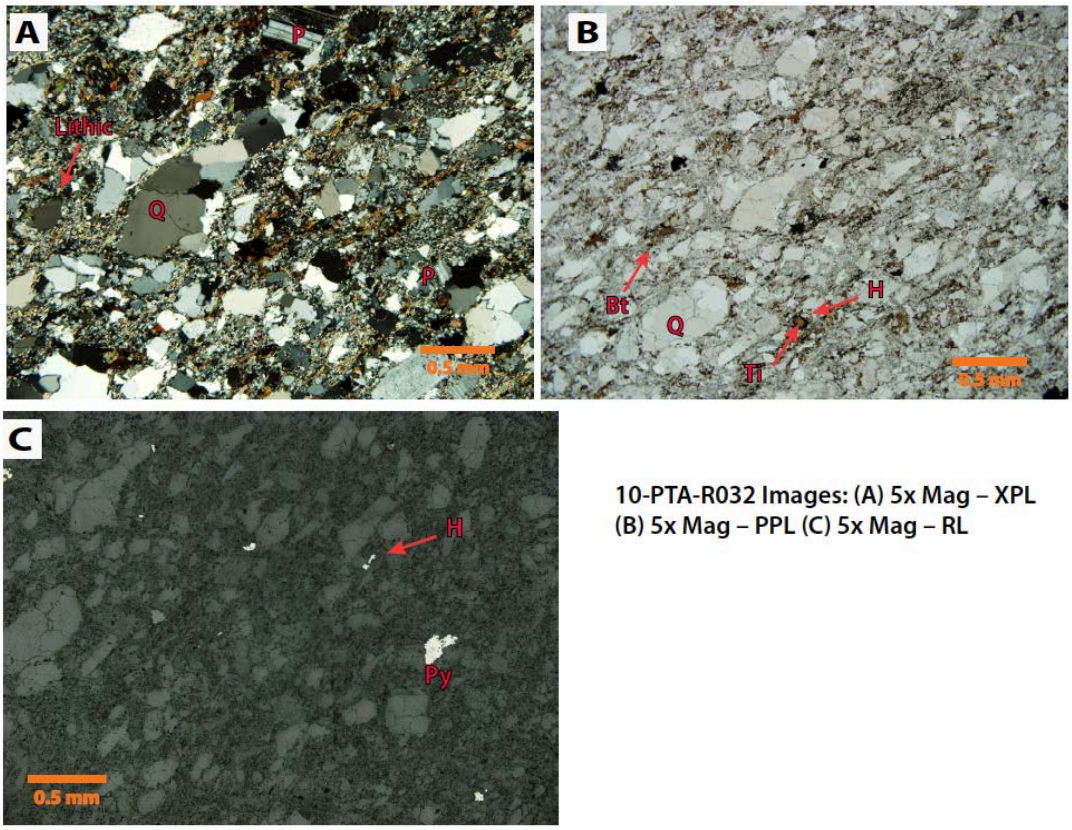


10-PTA-R026a Images: (A) 10x Mag – RL (B) 20x Mag – RL (C) 2.5x Mag – XPL (D) 2.5x Mag - PPL

10-PTA-R032

Rock name: Metagreywacke, weakly altered.
Map unit: Pipedream assemblage
Field relationships: Heaved, glacially rounded, shoreline outcrop and felsenmere 7.4 km southeast of KMZ, at the southeast end of a long lake east of Pointer Lake. Mapped as greywacke by Urangesellschaft in the 1980s. Outcrop and specimen photographs are in Appendix B.7. This facies is thick bedded by analogy to sample 11JP398 from the east side of the gulley flanking the Lone Gull camp on the west.
Sample description: Dark grey, indistinctly bedded (sample from part of a thick bed), well foliated, nonmagnetic metagreywacke very similar to sample 11JP398 (west side of the Lone Gull camp) that yielded a suite of detrital zircons very similar to that of the type Pipedream assemblage near the Meadowbank gold mine (unpublished data from V. McNicoll, 2013).
Texture: Well foliated, seriate grain-size distribution with large polygonized grains of feldspar and quartz surrounded by finer grained quartz, feldspar, and micas, all recrystallized.
Mineralogy:

- **60% Undifferentiated plagioclase/lithic grains:** 50 μm – 3 mm (median = 400 μm). Interlocking grain boundaries are commonly altered; some albite twinning.
- **30% Quartz:** 25 μm – 3 mm. (median = 400 μm). Anhedral, commonly displays interfingered grain boundaries; polygonized in larger grains.
- **15% Biotite:** 50– 400 μm. (median = 150 μm). Subhedral to euhedral, weakly foliated, commonly wraps around quartz and feldspar crystals.
- **3% Titanite:** Possibly rimmed by magnetite. 100 μm – 1 mm. (median = 100 μm). Isotropic, brown in XPL and PPL, not pleochroic. Rimmed by silver-grey opaque. High positive relief.
- **<1%Garnet? (**pseudomorphed): Isotropic, ~400 μm, completely altered to muscovite / sericite and other clay minerals.
- **5% Sericite:** <25 μm. Interstitial, an alteration product of feldspar.
- **<1% Green unidentified:** Shape of apatite but interference colours too high (~200–300 μm).
- **<1%Pyrite:** 25–200 μm (median = 150 μm). Subhedral to euhedral, disseminated.
- **<1% Hematite:** <50 μm. Fine-grained, disseminated, locally intergrown with titanite replacing magnetite.
- **<1% Chalcopyrite:** <50 μm. Very few grains, disseminated.

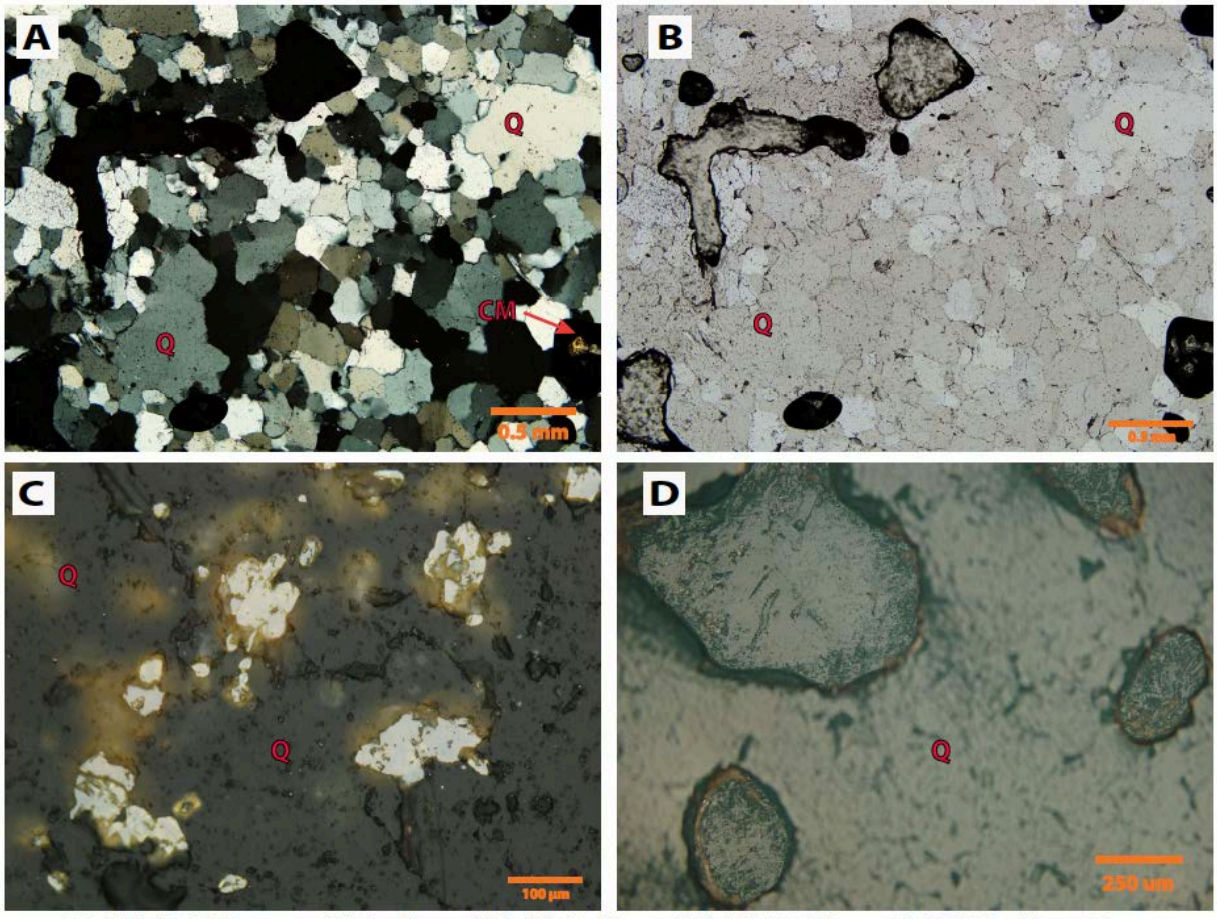


10-PTA-R032 Images: (A) 5x Mag – XPL
(B) 5x Mag – PPL (C) 5x Mag – RL

10-PTA-R040

Rock name: Quartzite.
Map unit: Ketyet River group
Field relationships: Heaved outcrop overlying Kiggavik East Zone, ~1.3 km east of the Main Zone. Same station as 10JP018 (transected by thin altered bostonite dyke). Surrounded by till.
Sample description: Shiny white, slightly weathered (hematitized), with yellowish patches (sericite) along stylolitized bedding plane partings. Photographs are in Appendix B.8.
Texture: Sutured, moderately sorted, polygonized quartz (primary textures not preserved).
Mineralogy

95% Quartz: 100 μm – 1.5 mm (median = 250 μm). Subangular to subrounded.
2% Clay Minerals: Very fine grained, <25 μm, interstitial to quartz grains.
1% Hematite: 25–200 μm (median = 100 μm); anhedral to subhedral; Ddisseminated.

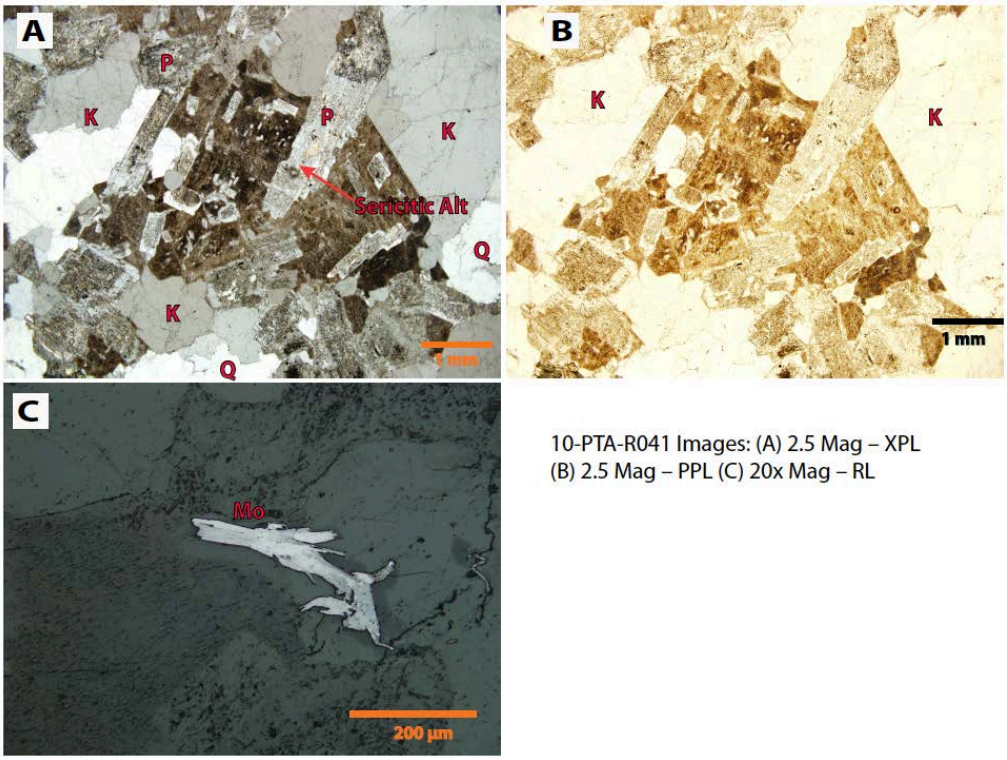


10-PTA-R040 Images: (A) 5x Mag – XPL (B) 5x Mag – PPL (C) 20x Mag – RL (D) 10x Mag - RL

10-PTA-R041

Rock name: Granite
Map unit: Lone Gull plug: Hudson and/or Nueltin granite
Field relationships: Drill core from KMZ (**MZ-07-04 (92.48–92.77 m)** starts in highly altered metagreywacke, intersects granite at about 50 m.
Sample description: Coarse-grained, non-magnetic felsic granitoid with quartz and alkali feldspar phenocrysts; minor clay alteration. Photographs of drill core in the box, and polished cuts are in Appendix B.9.
Texture: Interlocking plutonic, weakly porphyritic.
Mineralogy:

45% Alkali feldspar: 300 μm – 5 mm (median = 2 mm) Subhedral, perthitic, commonly weathered to clay minerals, with some grains being altered to muscovite and kaolinite. Several grains display minor hematite staining.
30% Quartz: 200 μm – 4 mm (median = 1.5 mm); anhedral.
20% Plagioclase: 200 μm – 4.5 mm (median = 2 mm). Subhedral to euhedral, saussuritized, and locally sericitic.
7% Muscovite: 50–400 μm (median = 200 μm); subhedral to euhedral. Replacing many feldspars, particularly alkali feldspars, and as an interstitial mineral.
1% Chlorite: 100 μm – 3 mm (median = 2 mm); euhedral, alters to muscovite where it replaces plagioclase.
<1% Zircon: 25 μm (only one grain observed).
<1% Pyrite: 50–150 μm (median = 50 μm); subhedral, interstitial.
<1% Magnetite: <25–300 μm (median = 100 μm); subhedral, disseminated throughout sample.
<1% Molybdenite: 300 μm (one grain observed); tabular, elongated, euhedral.
Clay minerals: Occupies cores of feldspars, particularly plagioclase.



10-PTA-R041 Images: (A) 2.5 Mag – XPL
(B) 2.5 Mag – PPL (C) 20x Mag – RL

10-PTA-R044

Rock name: Metagreywacke, slightly clay altered. **Map unit:** Pipedream assemblage
Field relationships: Core of KMZ (MZ-07-04, 38.9 m) above granite. Photographs of core in Appendix B.11.
Sample description: Medium to brownish grey, relatively fresh in appearance with minor clay and chlorite alteration, indistinctly laminated to massive bedded, medium- to fine-grained metasedimentary rock with minor pyrite.
Texture: Fine-to medium-grained, foliated.
Mineralogy:

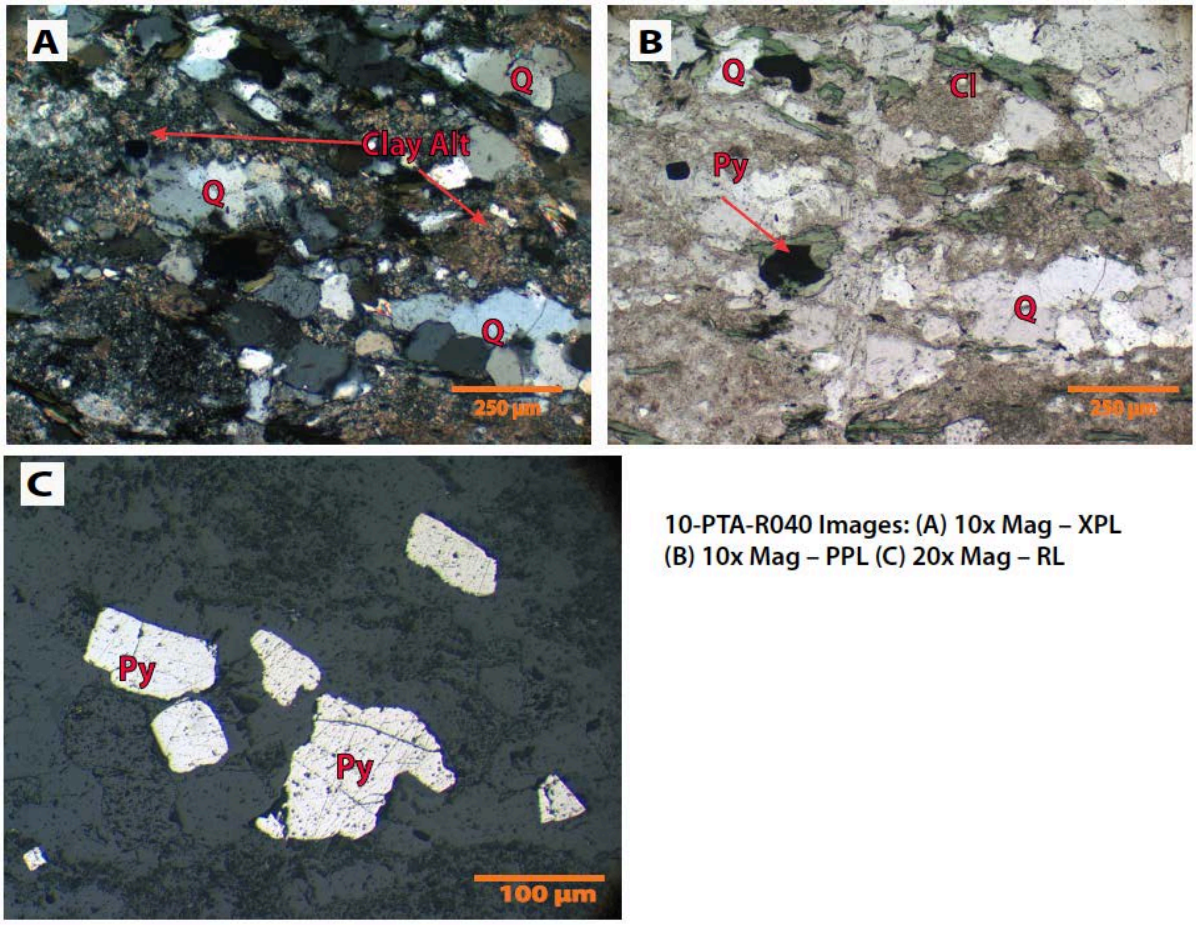
40% Quartz: <50 µm – 1 mm (median = 100 µm); subhedral, elongated and oriented parallel to foliation. Secondary quartz veining occurs parallel to foliation, typically consisting of coarse-grained quartz.

40% Clay Minerals: Very finely crystalline, <50 µm. High birefringence suggests sericite and illite. Replaces feldspars and fills veinlets perpendicular to foliation.

15% Chlorite: <50–300 µm (median = 100 µm); subhedral, felted masses. Green in PPL, with slight pleochroism. Wraps around many elongate quartz grains.

1% Muscovite: 50–100 µm. Felted masses, high 2nd-order birefringence.

4% Pyrite: <25–750 µm (median = 75 µm); subhedral to euhedral, blocky. Finely disseminated and in veinlets of secondary quartz and clay minerals.



10-PTA-R040 Images: (A) 10x Mag – XPL
(B) 10x Mag – PPL (C) 20x Mag – RL

10-PTA-R045

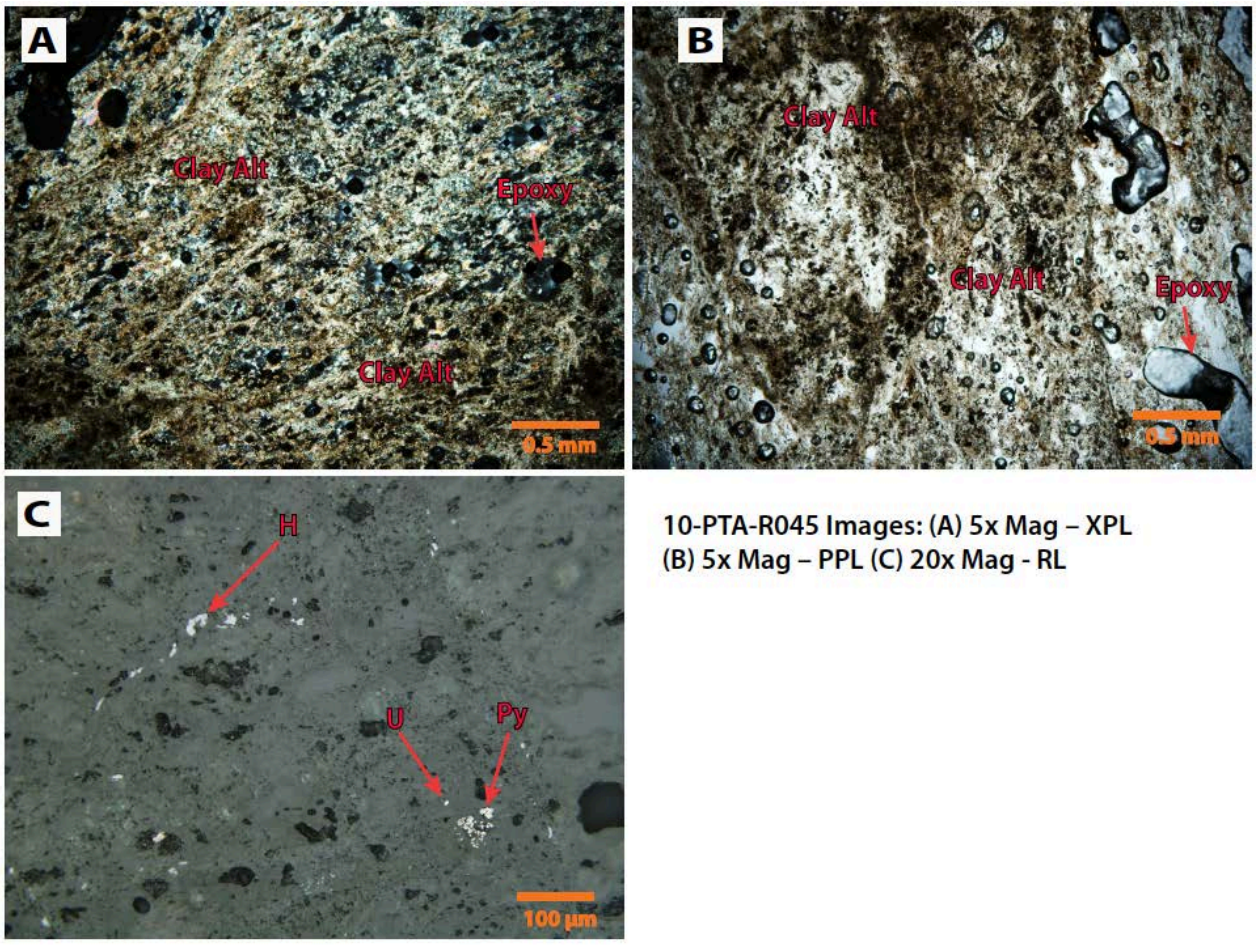
Rock name: Epiclastic or metagreywacke, highly altered.
Map unit: ? Pukiq / Pipedream?
Field relationships: Drill core through KMZ: LG-241 (134 m).
Sample description: Chalky whitish yellow, with blackish tint, highly fractured, and extremely altered ?epiclastic rock or greywacke? with elevated radioactivity. Photograph of end of core sample is in Appendix B.12.
Texture: Fine-grained, well foliated, late fractures.
Mineralogy

98% Clay alteration: <25 µm. Sample is extremely altered leaving little to no trace of original mineralogy. Quartz is not present. However, some muscovite grains with kaolinite alteration range in size from <25–100 µm.

1% Hematite: <25–100 µm (median = 50 µm); anhedral to subhedral, cream-grey, disseminated and commonly rimming pyrite grains.

<1% Pyrite: <25–100 µm (median = 50 µm); subhedral, commonly displaying a framboidal texture. Disseminated and commonly rimmed by hematite.

<1% Uraninite: <25 µm. Clusters of cryptocrystalline grains, high positive relief, less than five grains observed. Very hard to distinguish (SEM verified).

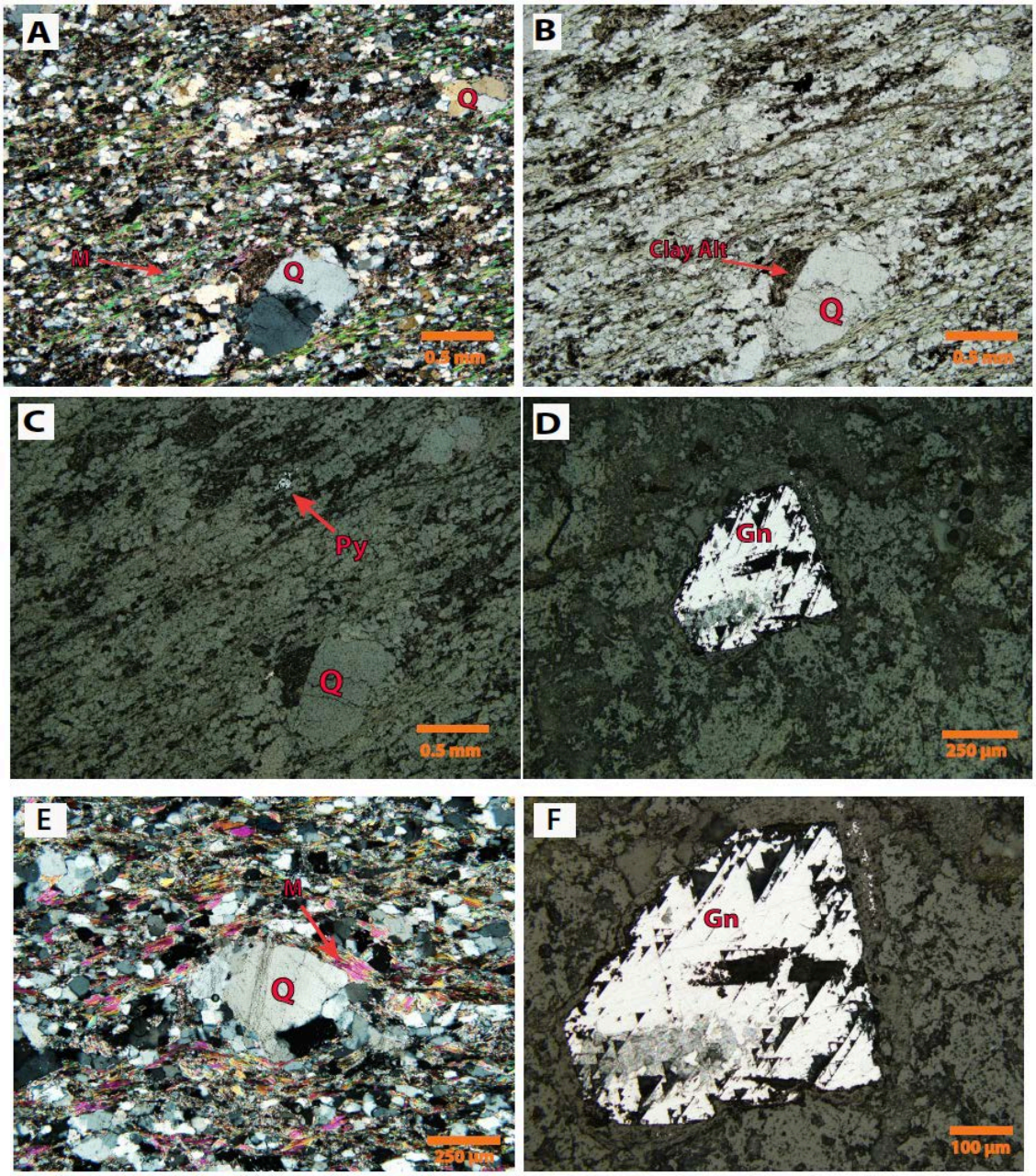


10-PTA-R045 Images: (A) 5x Mag – XPL
(B) 5x Mag – PPL (C) 20x Mag - RL

10-PTA-R046

Rock name: Rhyolite, porphyritic, highly foliated, altered.
Map unit: Pukiq Lake Formation
Field relationships: Drill core through KMZ: LG-241 (40.38 m).
Sample description: Weakly radioactive, chalky white, yellowish (uranophane?), with bands of grey alteration along small fractures. Photograph of drill core is in Appendix B.12.
Texture: Aphanitic with common flattened phenocrysts of polycrystalline quartz. Strongly foliated; minor cross-cutting fractures.
Mineralogy:

- **35% Quartz:** <25–400 μm (median = 150 μm); anhedral to subhedral, subrounded, slightly elongated and weakly oriented parallel to foliation. Mica minerals wrap around quartz.
- **35% Muscovite / Sericite:** <25–200 μm (median = 100 μm); subhedral to euhedral, needle / very elongated habit. High 2nd order to 3rd order birefringence. Wraps around quartz and feldspar crystals.
- **23% Clay Alteration:** <25 μm; indistinguishable; clay minerals with lower birefringence are believed to be hematite-dominated although they are non-reflective. Higher order colours are tentatively attributed to illite.
- **5% Alkali feldspar:** 50–300 μm (median = 200 μm); subhedral, most grains have been completely altered to clay minerals, yet pseudomorphs of feldspar remain.
- **<1% Rutile:** <25–75 μm (median = 30 μm) (found by SEM); subhedral, slightly altered, can be mistaken for an opaque.
- **<1 %Iron oxides (limonite / hematite):** <25–100 μm; anhedral, disseminated, appears to replace some micas.
- **<1% Pyrite:** <25–75 μm (median = 25 μm); anhedral, disseminated.
- **<1% Galena:** (plates D and F: one grain ~500 μm in size); found along fracture that is dominated by very fine-grained and extremely altered mineralogy (possibly limonite- and/or hematite–dominated). Very fine-grained (<50 μm), anhedral, replacement galena (potentially radiogenic) in foliation fractures.
- **1% Fluorapatite:** 25–150 μm (median = 50 μm) (found by SEM); subhedral, rounded grain boundaries and highly altered Pb replacement of Ca (likely radiogenic) rimming. Clay minerals wrap around it.



10-PTA-R046 Images: (A) 5x Mag – XPL (B) 5x Mag – PPL (C) 10x Mag – RL (D) 10x Mag – RL
(E) 5x Mag – XPL (F) 20x Mag - RL

10-PTA-R047*

Rock name: Rhyolite, silicified.

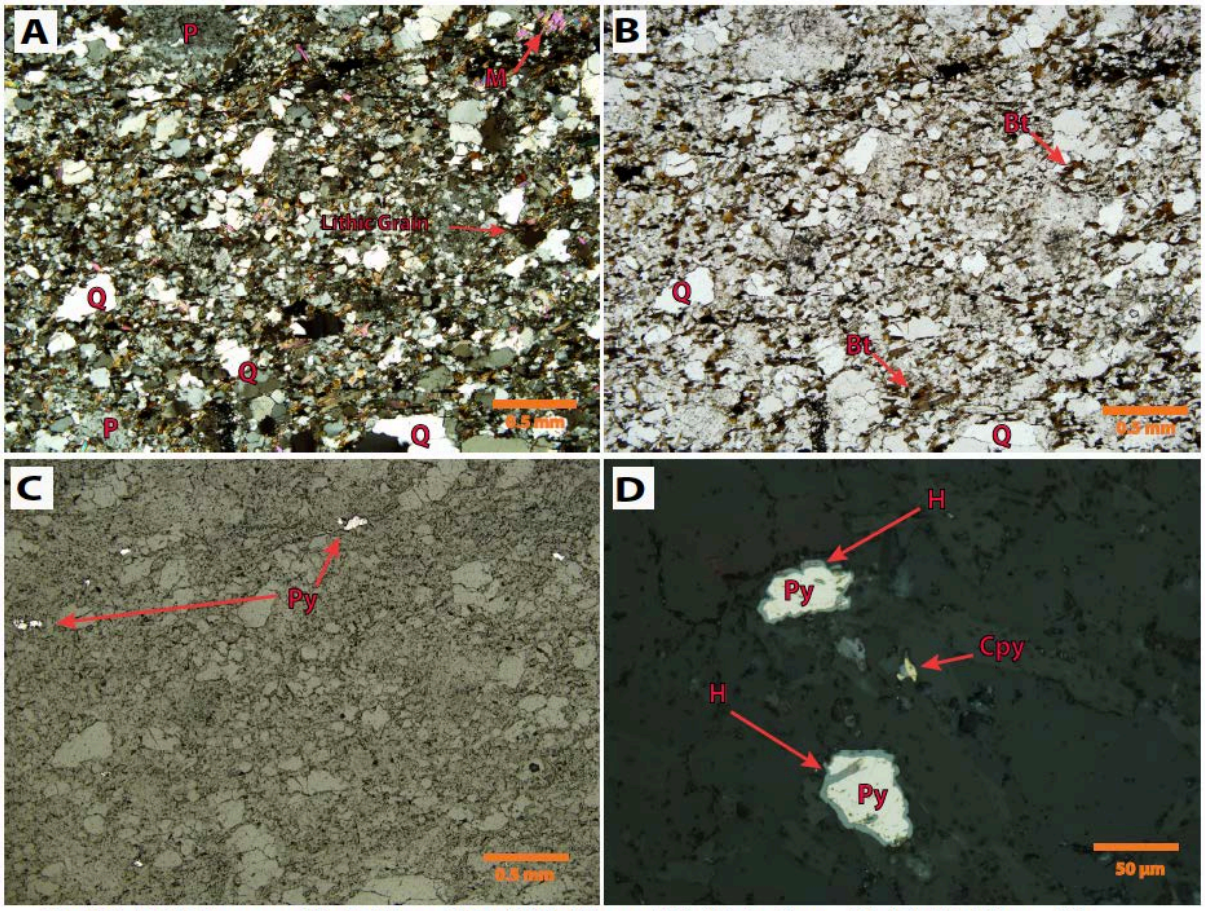
Map unit: Pitz Formation rhyolite; brecciated and silicified by cryptocrystalline and drusy quartz veins coated with specular hematite.

Field relationships: Small raised outcrop within area previously mapped as undivided mafic Archean volcanic rocks some 28 km south-southwest of KMZ and 1.1 km southwest of large body of Snow Island Suite granite, the Judge Sissons Pluton. Outcrop and hand specimen data show this to be identical to silicified brecciated rhyolite in the Judge Sissons Fault from Andrew Lake. At this station, the fault occupied by silicified rhyolite trends north-south along the east side of Judge Sissons Lake and demarks the west side of the linear outcrop. Toward the north end of the outcrop, a clearly defined subglacial roche moutonnée structure has its steep end located at the fault. The eastern, gently sloping, stoss side of the roche moutonnée and the east side of the north-south ridge-forming outcrop exposes westerly dipping, well bedded quartzite assigned to the Ketyet River group. This quartzite is interpreted as a continuation of previously mapped quartzite bodies that have similar dips to the southeast and northeast. Outcrop and hand specimen photographs are in Appendix B.12 and B.13, and binocular description in Appendix C.

*****Although this sample was not described in thin section, disaggregation yielded multiple gold grains (see Appendix E.2. and Discussion in text). Further detailed examinations and analyses of the sample material and outcrops are warranted.

10-PTA-R048

Rock name: Metagreywacke, foliated, fresh.
Map unit: Pipedream assemblage.
Field relationships: Located just northeast of Judge Sissons Lake, near the Nutaaq syenite body. It was mapped as "dirty quartzite" by Urangesellschaft, the same map unit as the host rock at Kiggavik, which GEM has re-assigned as metagreywacke. Bedding is transposed parallel to foliation, which dips gently to the north.
Sample description: Dark grey, indistinctly bedded, foliated, fine-grained metasedimentary rock metamorphosed to greenschist facies (no photographs in Appendix B).
Texture: Fine-medium-grained, weakly foliated, indistinctly bedded metagreywacke with seriate quartz and feldspar clasts floating in finer grained micaceous matrix.
Mineralogy:
35% Quartz: 50 μm – 2.5 mm (median = 100 μm); poorly sorted, there are multiple subrounded, polycrystalline quartz grains and smaller equant to more elongated quartz grains.
25% Biotite: 50–800 μm (median = 100 μm); subhedral to euhedral, platy, oriented parallel to foliation.
20% Plagioclase: 100 μm – 1 mm (median is 300 μm); partially recrystallized, subhedral, weakly altered, appears to have a lower An content.
10% Lithic Grains: 100 μm –1.2 mm (median is 300 μm);undifferentiable clastic grains.
5% Muscovite: 50–500 μm (median = 100 μm); euhedral, blockier than the biotite, etamorphic compared to the biotite. Many grains are bent or wrap around the quartz grains.
3% Pyrite: <25–250 μm (median = 75 μm); subhedral, disseminated, and commonly coated / rimmed by hematite. Commonly associated with biotite.
1%Hematite: <25–100 μm (median = 50 μm); anhedral, disseminated, and occurs only as a replacement / weathering product of pyrite. Could possibly be goethite??
<1% Chalcopyrite: <25 μm; subhedral, replacement of altered biotite, very few grains present, disseminated.

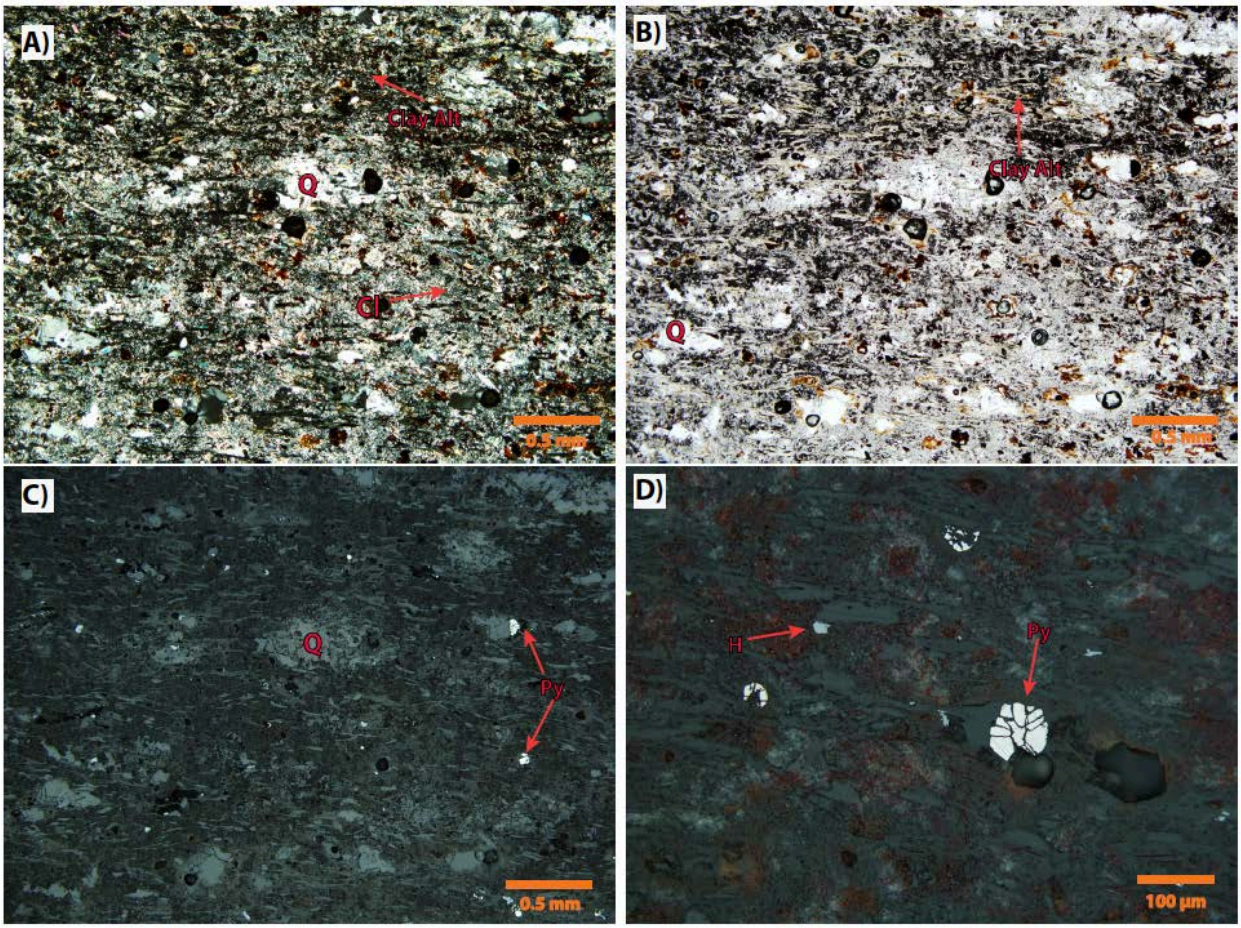


10-PTA-R048 Images: (A) 5x Mag – XPL (B) 5x Mag – PPL (C) 5x Mag – RL (D) 50x Mag – RL

10-PTA-R050

Rock name: Epiclastic, porphyritic, highly altered.
Map unit: Pukiq Lake Formation
Field relationships: Drill core through the KMZ (LG-241 -144 m). Photographs of core in box and as a specimen are in Appendix B.14.
Sample description: Reddish orange – yellowish white, fractured, and highly illitized and hematitized. Intense foliation is nearly perpendicular to core axis.
Texture: Highly foliated, very finely crystalline, with polygonized relict phenocrysts of quartz and feldspar. Disseminated pyrite is fractured and hematite forms tabular microcrystals.
Mineralogy:

- **70% Clay alteration** <25 μm; unidentifiable, weathering and alteration products of relict feldspars.
- **20% Quartz:** <25 μm – 1.5 mm (median = 300 μm); anhedral, polygonalized, forms small clusters interpreted as relict phenocrysts, foliation wraps around them.
- **5% Muscovite / Sericite:** 25–200 μm (median = 150 μm); subhedral, may be metamorphic as well as an alteration product of feldspars.
- **5% Chlorite:** 50–200 μm (median = 150 μm); subhedral, needle like (very elongated), slight green pleochroism. Occurs as slaths within the clay alteration. Oriented parallel to foliation.
- **3% Hematite:** <25–200 μm (median = 50 μm); subhedral, disseminated and closely associated with pyrite. Varies from slender laths, to rounded grains
- **2% Pyrite:** <25–250 μm (median = 50 μm); subhedral to euhedral, disseminated and commonly occurring with hematite and commonly acting as a replacement mineral.
- **<1% Fluorapatite:** <25–75 μm (found by SEM); anhedral to subhedral. A few fluorapatite grains have outer zones with elevated Pb and U (Ca replacement)



10-PTA-R050 Images: (A) 5 Mag – XPL (B) 5 Mag – PPL (C) 5x Mag – RL (D) 20x Mag - RL

10-PTA-R051

Rock name: Rhyolite or felsic epiclastic rock, very altered.
Map unit: Pukiq Lake Formation.
Field relationships: Drill core through the KMZ (LG-271, 45.11 m). Foliation/bedding is at a high angle to drill core axis. Photographs of core in box and as a hand specimen are in Appendix B.14.
Sample description: Yellowish white, highly altered, weakly radioactive metagreywacke.
Texture: Very fine-grained, well foliated, and somewhat fractured.
Mineralogy:

45% Quartz: 50–300 μm (median = 150 μm); anhedral, elongated and commonly truncated by mica minerals. Mineral boundaries are commonly distorted due to alteration.

44% Clay alteration: <25 μm; consumed all the feldspar grains in addition to most of the mica. Some quartz pseudomorphs are evident and have been replaced by clay alteration.

10% Muscovite: 25–200 μm (median = 100 μm); subhedral high 2nd order birefringence. Some grains are slightly altered to illite (3rd order birefringence).

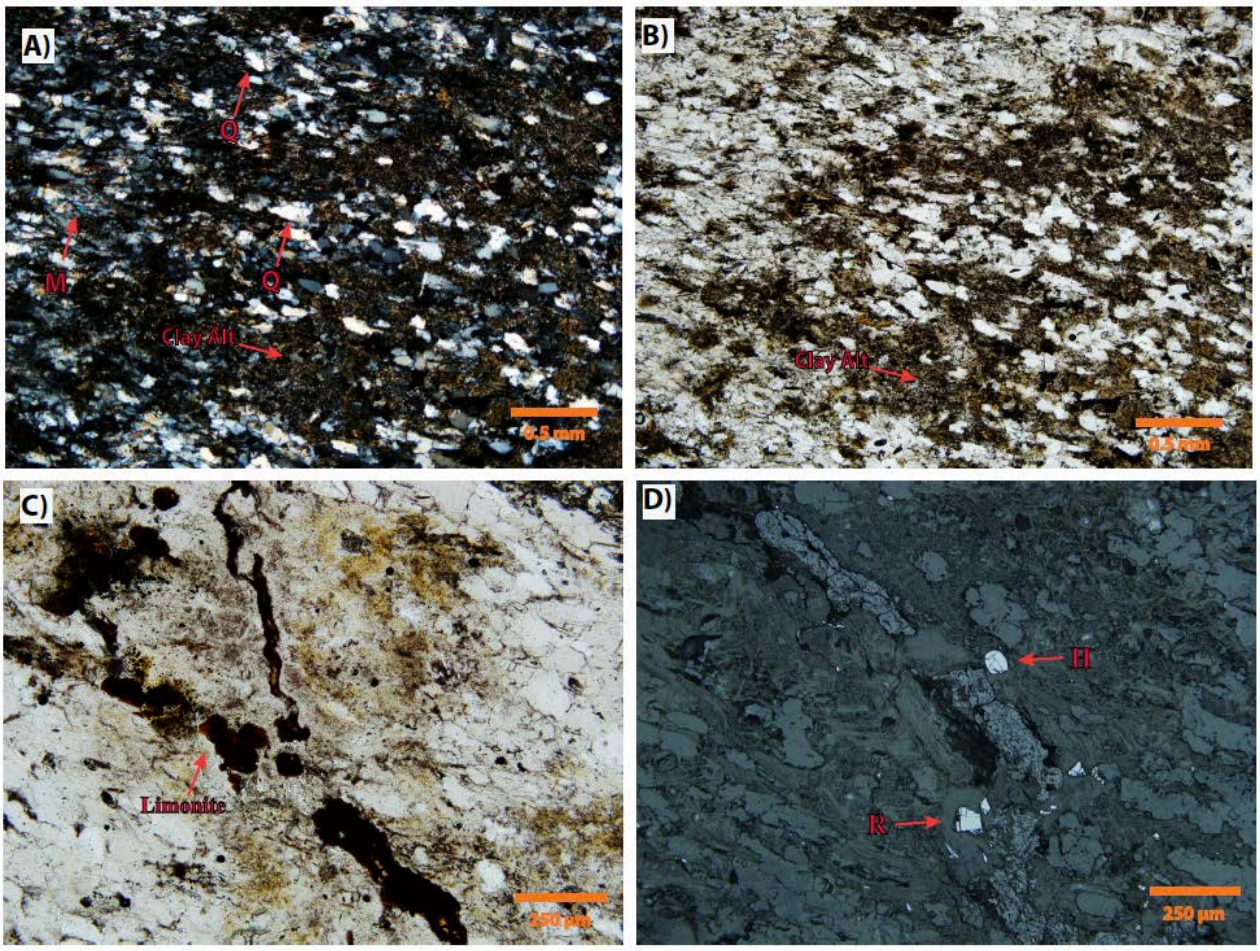
1% Fluorapatite: 15–100 μm (found by SEM); slightly hexagonal, with rounded edges. Disseminated throughout sample. A few fluorapatite grains have outer zones with elevated Pb and U (Ca replacement).

<1% Hematite: 50–100 μm; two grains observed. Light cream-grey, subhedral with minor zoning? Goethite?

1% Limonite?? Weathered hematite. Vein (50 μm thick) cutting through section (low positive relief (reddish / black in XPL and PPL, and light grey with positive relief in RL.

1% Rutile: 50–150 μm (median is 50 μm); high positive relief

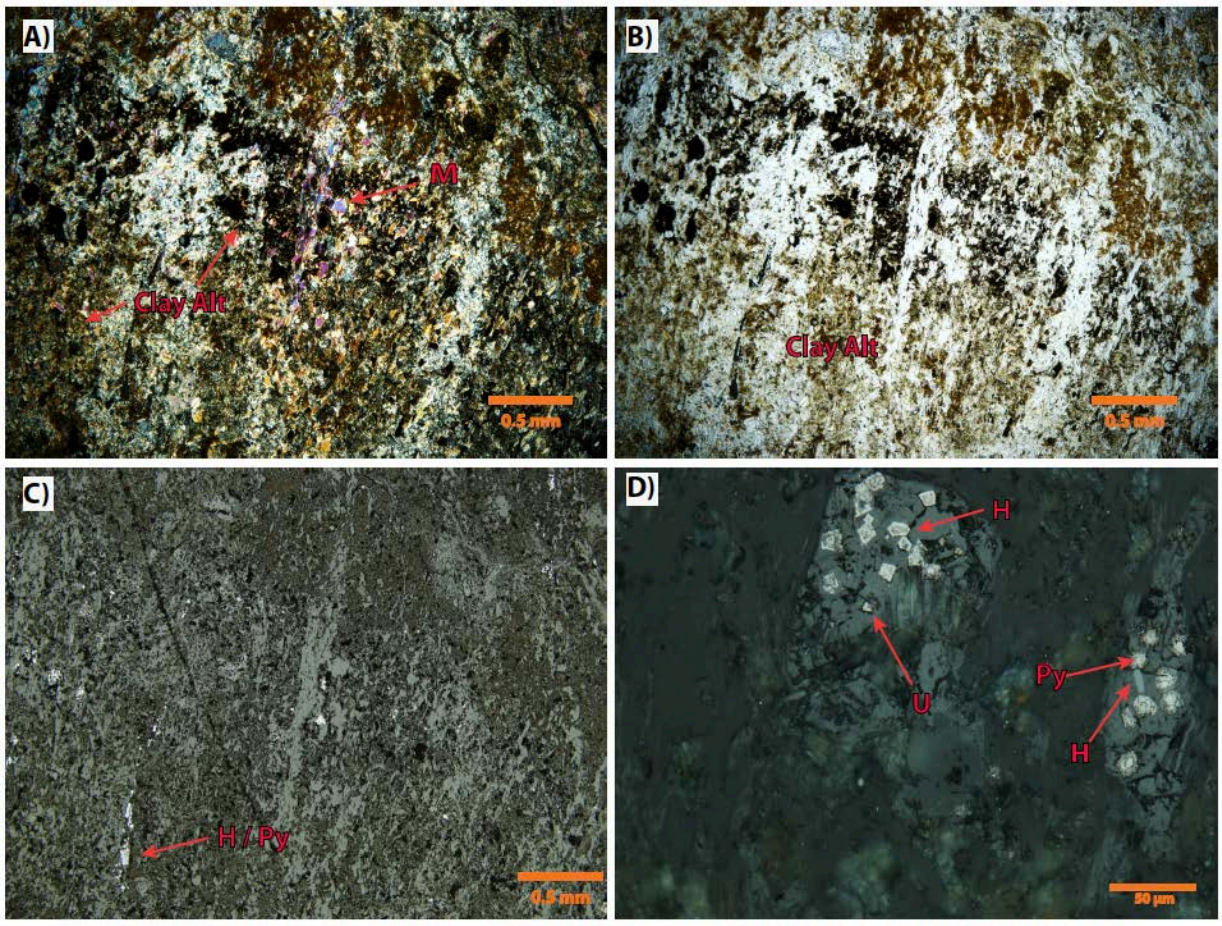
<1% Uraninite: <25–50 μm (found by SEM); disseminated, anhedral, commonly occurring along foliation breaks / fractures and is associated with higher levels of clay alteration.



10-PTA-R051 Images: (A) 5x Mag – XPL (B) 5x Mag – PPL (C) 10 Mag – RL (D) 10x Mag – RL

10-PTA-R053

Rock name: Epiclastic rock or metagreywacke, extremely altered.
Map unit: Pukiq Lake Formation or Pipedream assemblage
Field relationships: Drill core through KMZ: LG-271, 68.58 m. Photographs of core in box and as a hand specimen are in Appendix B.15.
Sample description: Whitish yellow, with orange oxidization, highly fractured rubbly core, extremely altered and with elevated CPS – a marginal part of the KMZ.
Texture: Foliated, fine grained.
Mineralogy:
98% Clay Alteration: <25 µm. Sample is extremely altered leaving little to no trace of original mineralogy. Quartz is not even present. However, some muscovite grains with kaolinite alteration range in size from <25 µm – 100 µm.
2% Muscovite / Sericite: 25 µm – 100 µm (median = 50 µm). Felted, wraps around relict minerals (likely quartz and feldspar) High birefringence (high 2nd order)
1% Pyrite: <25 µm: : <25 µm – 100 µm (median = 50 µm): Subhedral, commonly displaying a framboidal texture. Disseminated and commonly rimmed by hematite
1% Hematite: <25 µm – 100 µm (median = 50 µm): Anhedral – subhedral, cream grey, disseminated and commonly rimming pyrite grains and found in small veinlets
<1% Uraninite <25 µm –50 µm (median = 25 µm) (Confirmed by SEM). Medium - Cream grey in RL, darker than hematite and commonly encompassing and intermixed with pyrite and hematite grains.



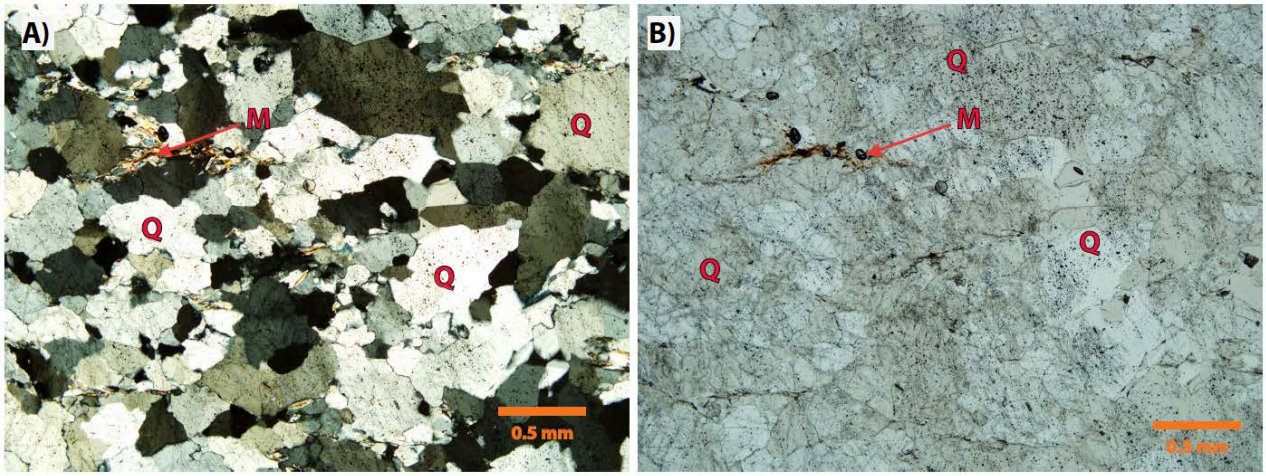
10-PTA-R053 Images: (A) 5x Mag – XPL (B) 5x Mag – PPL (C) 5x Mag – RL (D) 50x Mag – RL

10-PTA-R054

Rock name: Quartzite cut by vein quartz.
Map unit: Ketyet quartzite, vein quartz.
Field relationships: Drill core through KMZ: LG-216, 32 m. White vuggy quartz vein cuts massive appearing but foliated white quartzite with stylolites developed parallel to flattened bedding. Photographs of core in box, core as hand specimen, and cut surface of core showing stylolites are in Appendix B.16.
Sample description: White, massive, crystalline quartz, extensively fractured, faintly shear-banded, and locally brecciated and re-veined. Vugs show drusy quartz coated with specular hematite. Binocular microscope description of hand sample is in Appendix C.
Texture: Quartzite is polycrystalline with stylolitized micaceous bedding planes, veins are massive.
Mineralogy:

95% Quartz: 100 μm – 3 mm (median = 400 μm); massive, crystalline quartz.
5% Muscovite / Sericite: 100–700 μm (median = 400 μm); subhedral to euhedral. Located interstitially between quartz grains.

Notes:
This sample was chosen to learn more about the specular hematite and inward-growing quartz crystals observed in vugs and fractures of the hand specimen; however, no distinctive textures or mineralogical variations could be discerned in reflected light examination of polished thin section.

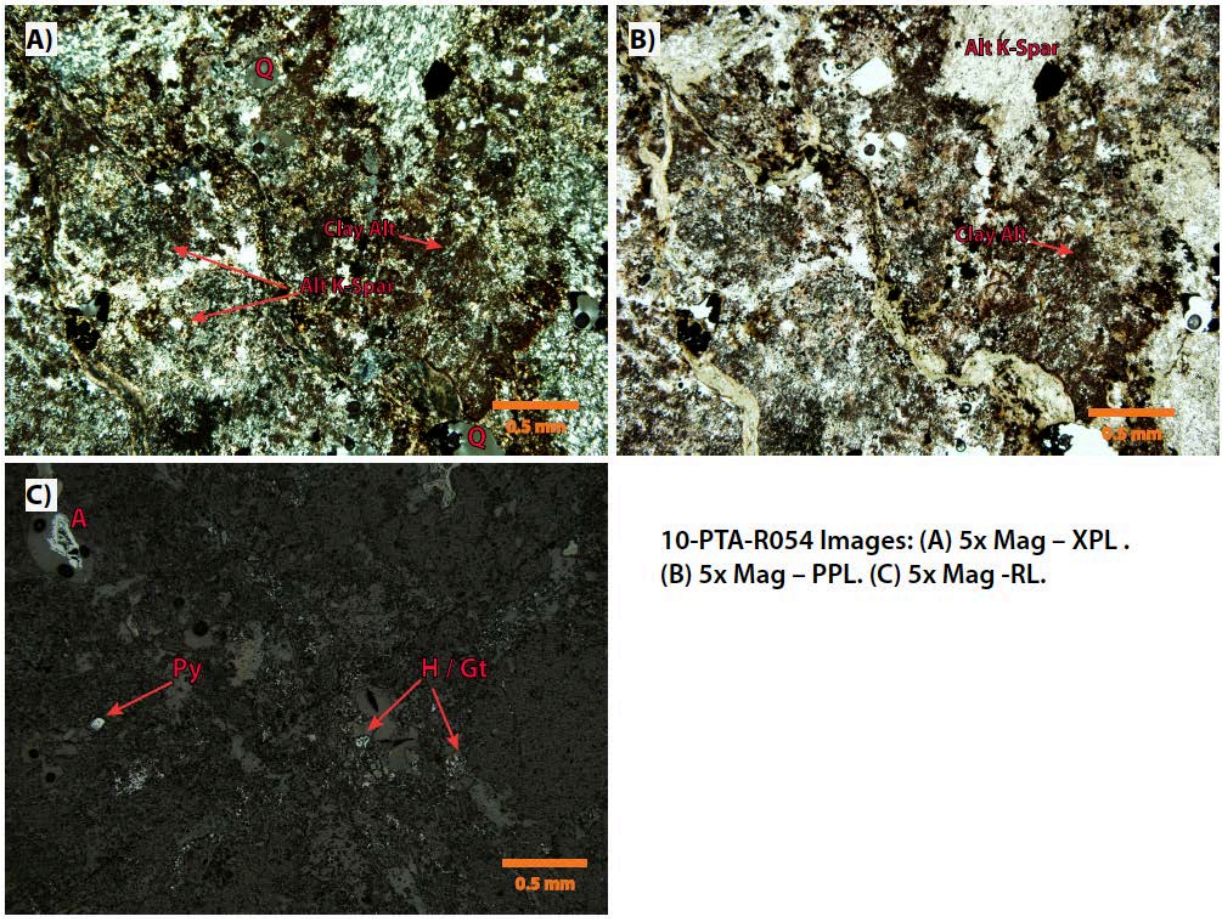


10-PTA-R054 Images: (A) 5x Mag – XPL (B) 5x Mag – PPL

10-PTA-R055

Rock name: Syenite, porphyritic, alkali.
Map unit: Martell Syenite.
Field relationships: Drill core through Kiggavik Centre Zone: CZ-07-01, 132 m. Photographs of core in box and close-up of wet core are in Appendix B.16.
Sample description: Reddish orange overall, salmon pink phenocrysts in dark red crystalline matrix with mottled black spots of altered mafic phases, hematitic, weakly fractured, no visible quartz.
Texture: K-feldspar phenocrysts in dark red finely crystalline felsic matrix.
Mineralogy

50% Clay, chlorite and hematite alteration: <25 μm; pseudomorphs feldspars, muscovite, and biotite, and replaces groundmass. Also forms clay-chlorite-only veinlets.
43% Relict Alkali feldspar: 100 μm –5 mm (median 500 μm); subhedral . Heavily weathered (surficial) to clay alteration with iron staining (hematite??). Rock is K-feldspar porphyritic.
1% Quartz: 0.1–0.8 mm (anhedral) (median = 0.25 mm); relict? Very finely crystalline.
1% Apatite: 50–200 μm (median is 150 μm); anhedral, generally located along altered fractures.
<1% Pyrite: <25–200 μm: (median = 75 μm); anhedral to subhedral, irregular shape.
<1% Hematite / Goethite: <25–150 μm (median = 100 μm); anhedral, disseminated, associated with pyrite, disseminated.



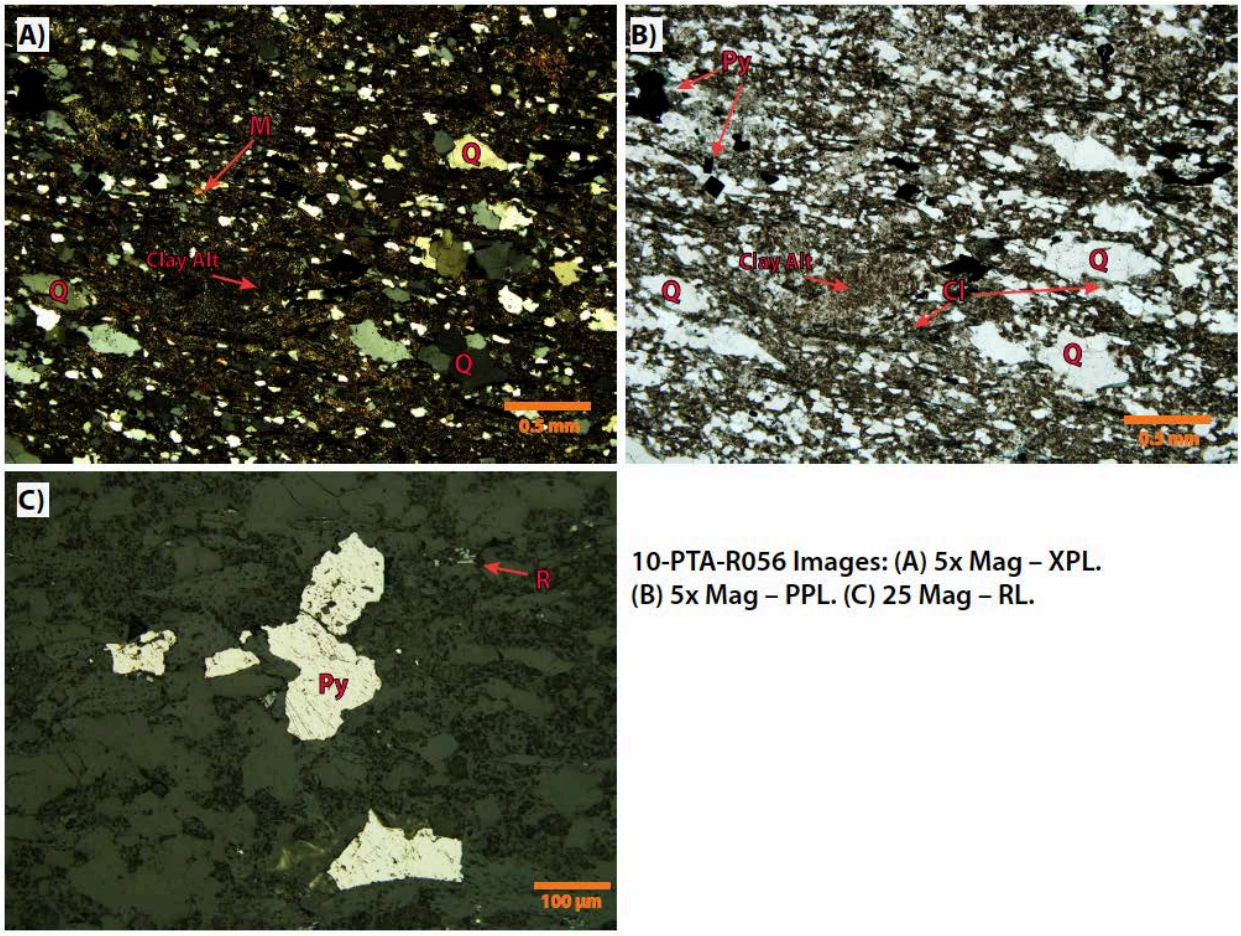
10-PTA-R054 Images: (A) 5x Mag – XPL . (B) 5x Mag – PPL. (C) 5x Mag -RL.

10-PTA-R056

Rock name: Metagreywacke, moderately altered.
Map unit: Pipedream assemblage
Field relationships: Drill core through Kiggavik Centre Zone: CZ-07-01, 129 m. Photographs of whole drill core and detail of cut surface are in Appendix B.16.
Sample description: Medium grey-green, with irregular diffuse bands of hematite alteration transecting the strong foliation. This nonmagnetic clastic metasedimentary rock contains disseminated pyrite and is cut by sub-mm wide, undeformed pyrite veinlets. The strong background green colour suggests a greater amount of chlorite than other metagreywacke samples.
Texture: Sub-millimetre scale, speckled appearance reflects fine-sand-size detrital texture. This is also foliated and cut by thin fractures at high angle to the foliation.
Mineralogy:

45% Clay Alteration: <25 μm; highly altered, recrystallization of undifferentiable, plagioclase / lithic grains and partial recrystallization of micas.
40% Quartz: <25 μm – 1 mm (median = 100 μm); anhedral, elongated (boudinaged), distinct undulose extinction. Foliated. Chlorite cuts through some quartz grains.
10% Chlorite: 100–600 μm (median = 400 μm); subhedral to euhedral, elongated, needle-like habit. Commonly associated with pyrite and secondary iron oxide.
3% Muscovite / Sericite: <25–100 μm (median = 50 μm); subhedral, blocky. Appears to have been replaced by chlorite??
2% Pyrite: <25–500 μm (median = 200 μm); subhedral to euhedral, disseminated, and clustered in micro veinlets. Appears to replace and/or coat some quartz grains.
<1% Fluorapatite: 75 μm (only one grain observed); greenish brown in PPL, subhedral.
<1% Chalcopyrite: <25–75 μm; anhedral, disseminated.
<1% Rutile: 25–100 μm (median = 75 μm); subhedral; looks like weathered iron oxide in RL; high interference colour.

This sample is interesting as chlorite is more prevalent as opposed to muscovite.



10-PTA-R056 Images: (A) 5x Mag – XPL.
(B) 5x Mag – PPL. (C) 25 Mag – RL.

10-PTA-R057

Rock name: Minette (lamprophyre).
Map unit: Dyke, intrusive equivalent of Christopher Island Formation mafic minette flows.
Field relationships: Drill core through KMZ: MZ-07-03, 95 m. Photographs of drill core specimen, cut surface of core specimen, and box of core showing minette in context with metasedimentary rock are in Appendix B.17.
Sample description: Dark grey, biotite phenocrysts weakly oriented, suggesting flow-foliation, nonmagnetic. Photograph in Appendix A shows one of the sparse xenoliths of granite with round shapes and reaction zone at contact with surrounding minette (not present in thin section). The dyke shows irregular reddish brown bands (hematite from oxidization). Pyrite is patchily disseminated in the sample and also present in quartz-carbonate veinlets.
Textures: Finely crystalline, abundant dark biotite phenocrysts, contains round granite-melt xenoliths, cut by irregular quartz-carbonate veinlets.
Mineralogy:

- **30% Alkali Feldspar**: 100 μm – 1 mm (median = 350 μm); subhedral, with minor clay alteration on the interior (kaolinite??); commonly has quartz along its grain boundaries.
- **30% Chlorite**: 50–500 μm (median = 300 μm); subhedral to euhedral, commonly rims biotite, forms groundmass, and contains disseminated pyrite commonly altered to iron oxide.
- **25% Biotite:** 50 μm – 1.5 mm (median = 300 μm); subhedral to euhedral. Commonly rimmed by chlorite with minor opaque inclusions (rutile and titanite).
- **10% Quartz:** 25–250 μm (median = 100 μm); anhedral, occurs along K-fespar boundaries, perhaps a secondary mineral from minor alteration of feldspars.
- **3% Pyrite**: 50–400 μm (median = 150 μm); subhedral to euhedral (cubic), many minor inclusions, chalcopyrite commonly adjacent. Disseminated
- **2% Fluorapatite:** 50–75 μm: (mostly observed under SEM); anhedral to subhedral with a few being hexagonal but most are subrounded.
- **<1% Chalcopyrite**: <25 μm; anhedral to subhedral. Commonly beside pyrite.

10-PTA-R058

Rock name: Epiclastic rock.
Map unit: Pukiq Lake Formation (possibly Pipedream pelite).
Field relationships: Taken from drill core MZ-07-03 (93.50 m). Photographs in Appendix B.17 show a single piece of core selected as sample as well as a box of drill core that includes a short section of minette dyke. Depositional layering is thin and transposed parallel to foliation, which is nearly perpendicular to core axis.
Sample description: Lenticular foliated medium to dark grey-green and greenish white structure suggests previously laminated metasedimentary rock that has been sheared. The greenish white lenticules are dominantly quartz with minor feldspar and clay-chlorite alteration products. Thin veinlets cutting foliation at a high angle are dominated by secondary coarse-grained quartz.
Texture: Fine-to medium-grained, subrounded detrital grains banded with clay alteration products with minor fracturing. Light and dark lenticules 1–3 mm thick suggest lapilli (if epiclastic unit of Pukiq Lake Formation) or transposed bedding laminae (if Pipedream assemblage) sheared off during deformation. The finely disseminated pyrite is euhedral with tiny inclusions of groundmass.
Mineralogy:

35% Quartz: <0.1 to 0.5 mm (mean 0.2mm); anhedral to subhedral, interlocked relict detrital grains that are subangular to subrounded, mainly subrounded. Occurs in bands dominantly made up of quartz. Larger grains (0.3–0.5 mm) infill fractures.

20% Muscovite / Sericite: 0.1–0.8 mm range, (medoan = 0.3 mm); anhedral to subhedral. Muscovite is foliated and occurs in bands with clay minerals and chlorite.

10 % Clay minerals: Hard to identify due to small grain size *<0.1 mm); appear to be the result of alteration on primary minerals. Occur in bands alternating with quartz – K-feldspar bands.

10% K-feldspar: <0.1—0.4 mm (mean 0.15 mm); anhedral. Present mainly as altered, feldspar pseudomorphs under extensive alteration to sericite / clay minerals.

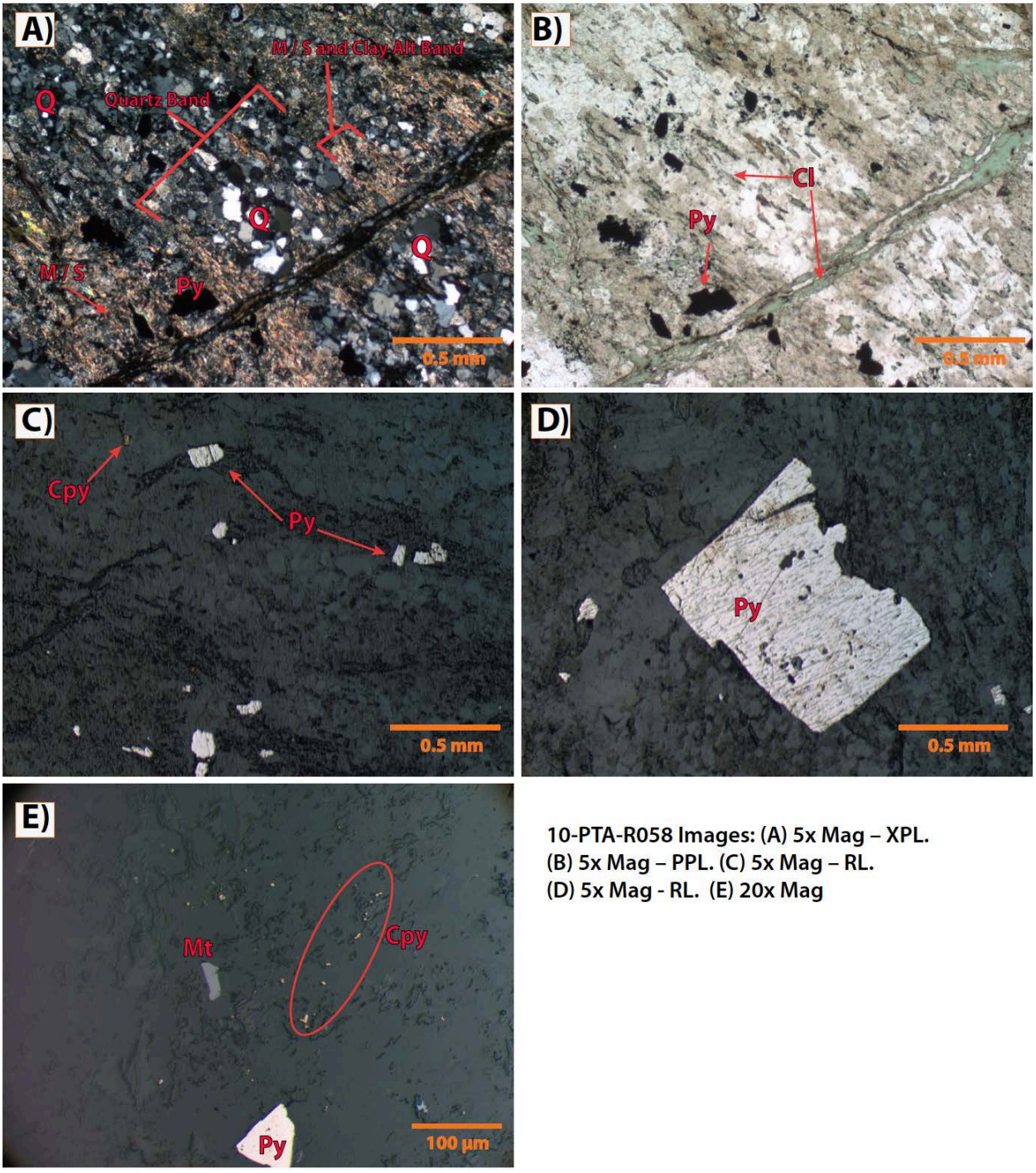
10 % Chlorite: <0.1 to 0.6 mm (mean 0.3mm); anhedral, elongated. Occurs throughout the sample and appears to be a secondary mineral occupying gaps in-between quartz grains and relict feldspar grains.

20% Muscovite / Sericite: 0.1 to 0.8 mm range; anhedral– subhedral,, mean is 0.3 mm. Muscovite is foliated and occurs in bands with clay minerals and chlorite.

4% Pyrite: Subhedral to euhedral, <100 μm to 1.5 mm, disseminated.

<1% Chalcopyrite: Anhedral, very small, and generally less than 50 μm. Disseminated

<1% Magnetite: Anhedral to subhedral, very small, and all less than 50 μm.



10-PTA-R058 Images: (A) 5x Mag – XPL.
(B) 5x Mag – PPL. (C) 5x Mag – RL.
(D) 5x Mag - RL. (E) 20x Mag

10-PTA-R059*

Rock name: Epiclastic rock or metapelite, highly clay altered.

M**ap unit:** Pukiq Lake Formation (Snow Island Suite) or Pipedream assemblage, Woodburn Lake group.

Field relationships: Drill core through CZ: CZ-09-02, 88.6 m. Photographs of drill core in box and as specimen are in Appendix B.

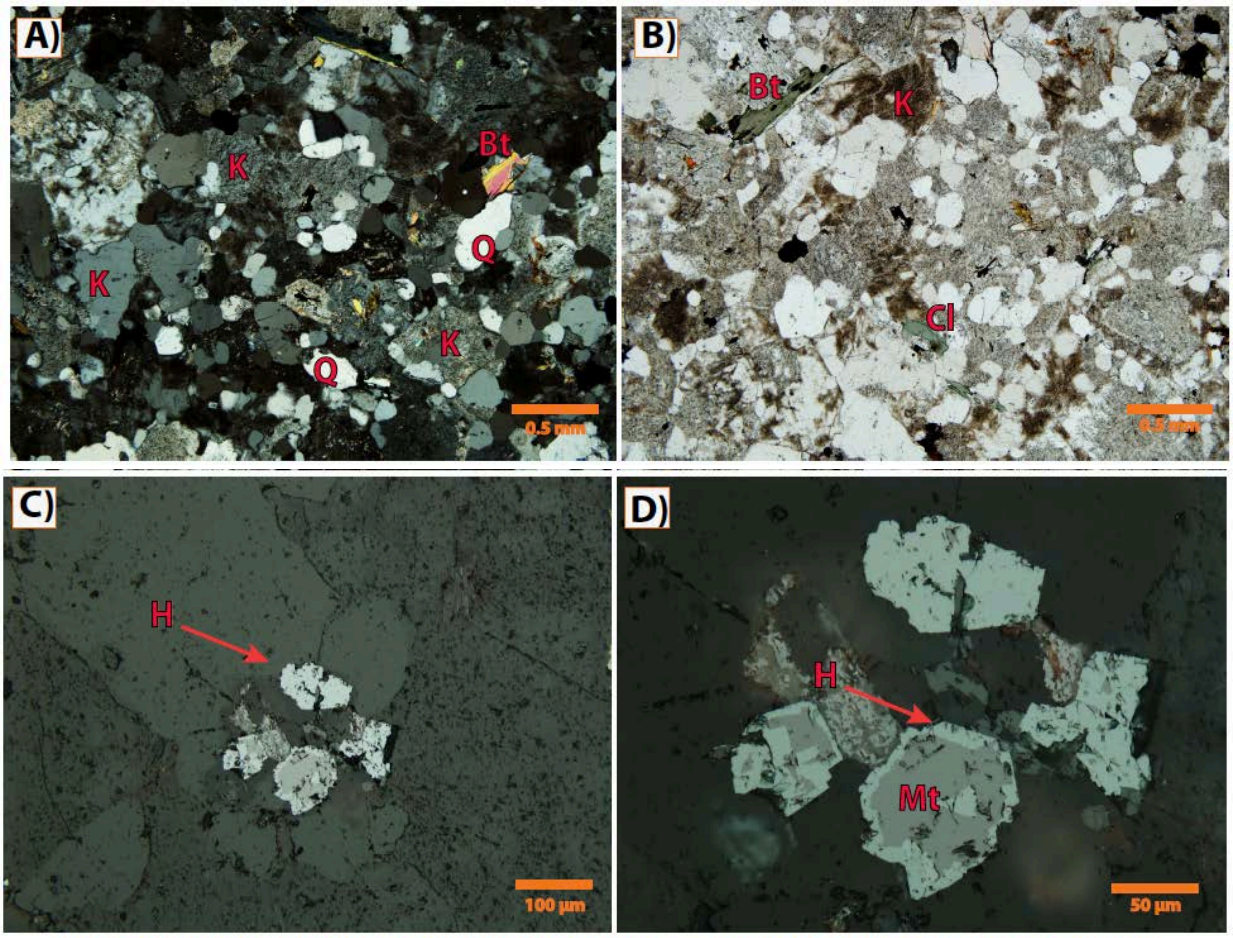
*****This sample is essentially all clay and was not examined microscopically in this study, either under binocular or petrographic microscope. It is very light creamy white in colour, with relict foliation that is at a high angle to the core axis and diffuse disseminated patches of yellow limonite to red hematite. The sample exemplifies highly altered uraniferous material that would yield only clay sized material in till. It is also like sample 10-PTA-R058 in that it also exemplifies the difficulty in determining the protolith of highly altered fine-grained metasedimentary rocks: It could have been a facies of the 2.7 Ga Pipedream assemblage or a felsic epiclastic facies of the 2.6 Ga Pukiq Lake Formation. The initial field name was lamprophyre, which confirms it is of supracrustal lithology.

10-PTA-R060

Rock name: Leucogranite, porphyritic.
Map unit: Hudson and/or Nueltin Granite
Field relationships: Drill core through KMZ: MZ-09-02, 250.62 m. Photographs in Appendix B.18 illustrate cylindrical and cut core samples.
Sample description: Pale pink, massive, porphyritic, weakly magnetic, 3% large, 3–8 mm, rounded grey quartz phenocrysts and 1% each of smaller 2–3 mm, white perthitic alkali feldspar and biotite phenocrysts.
Texture: Millimetre-scale crystalline matrix with abundant 3–4 mm diameter quartz and feldspar phenocrysts; a few mafic minerals, undeformed.
Mineralogy:

- **45% K-feldspar:** <0.1–8 mm (median = 0.25 mm); subhedral, perthitic, mildly altered. Commonly has minor inclusions of quartz (<0.1 mm in size).
- **40% Quartz**: 0.2 to 1 mm (median = 0.4 mm). Anhedral, and occurs interstitial to the feldspar. Also forms small secondary fracture-fill veining and is a constituent of the groundmass.
- **5% Biotite:** 100 μm to 3 mm (median = 0.25 mm); subhedral, variably chloritized.
- **2% Muscovite:** <100–200 μm (median = 175 μm); interstitial, high birefringence, elongated and appears to be a secondary mineral**.**
- **<1%Hematite / goethite:** rimming around magnetite: <25– 00 μm.
- **<1% Pyrite:** <0.1 mm; **s**ubhedral; very finely disseminated.
- **<1% Magnetite:** <0.1–1 mm; only two or three grains were observed (subhedral to euhedral). Rimmed by hematite.

Groundmass: Medium-grained, consisting of ~35% quartz, 60% alkali feldspar, 3% Biotite.



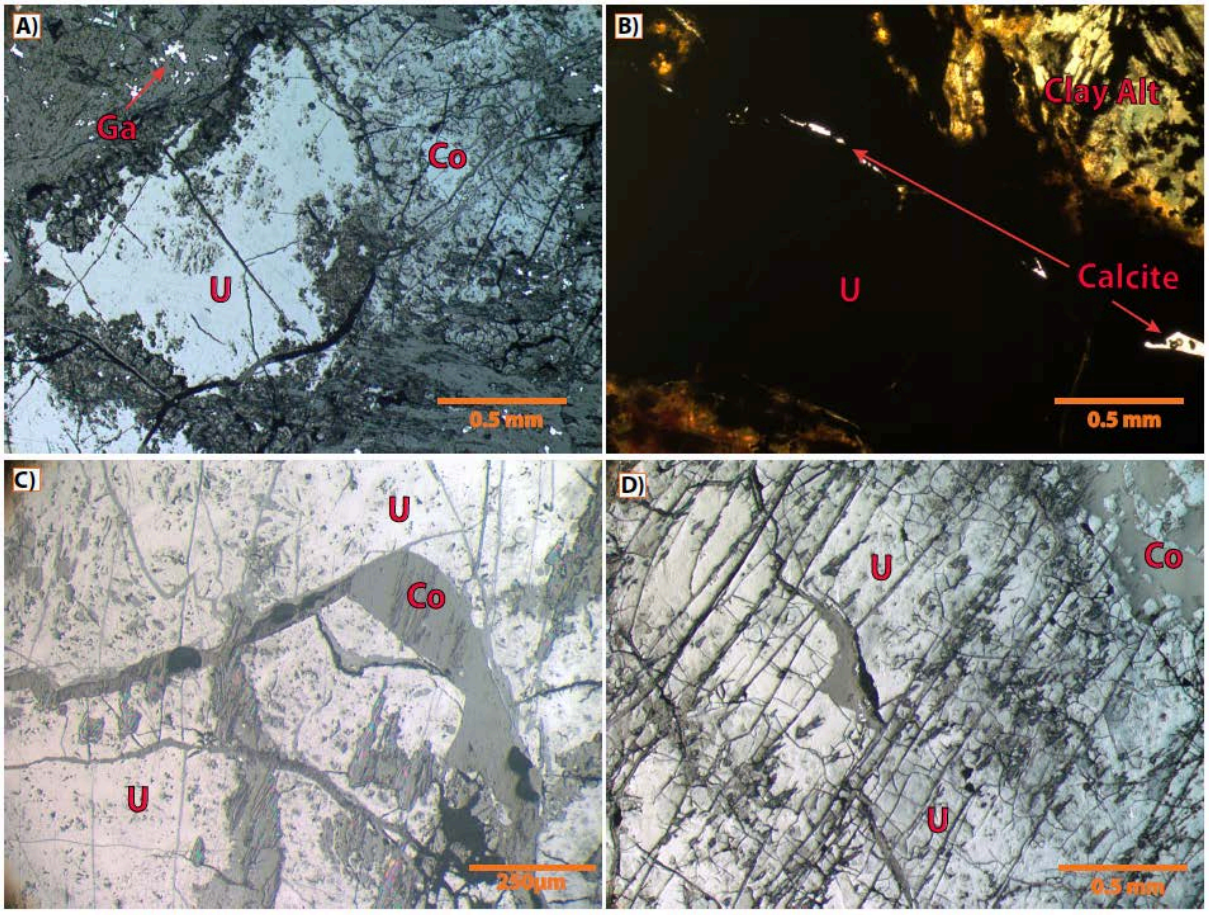
10-PTA-R060 Images: (A) 5x Mag – XPL. (B) 5x Mag – PPL. (C) 5x Mag – RL. (D) 5x Mag - RL.

10-PTA-R063

Rock name: Epiclastic rock or metapelite, heavily altered with disseminated uranium oxides.
Map unit: Pukiq Lake Formation or Pipedream assemblage.
Field relationships: Drill core LG-208 (85.34 m). Highly altered, rubbly clayey material almost completely broken up (photographs in Appendix B.20).
Sample description: Black to yellow-brown, highly altered metasedimentary rock, primary minerals are not present and uranium oxide minerals are abundant.
Texture: Felted, finely crystalline clay minerals and uraninite replace the protolith: an enigmatic, fine-grained, highly foliated metasedimentary rock.
Mineralogy:

- **50% Uraninite:** <25 μm to >2 mm (median = 200 μm); coarsely crystalline, massive, subhedral, and densely disseminated to massive, transected by multiple intersecting veinlets of calcite and quartz + calcite. Replacement of host rock ranges from along relict mineral boundaries and fractures to complete. In places also form anhedral to subhedral, whitish grey (in reflected light) replacement of mica flakes. Generally silver grey in reflected light with local darker grey sections, which are associated with lower U content and increased Si or Ca content (verified by Microprobe).
- **29% Clay alteration:** <25 μm; due to alteration, mineralogy is unknown. Extreme alteration makes it appear as if it is opaque.
- **15% Coffinite**: <25–100 μm (median = 75 μm); steel-grey in RL, anhedral, forming thin, felted dendritic-like patterns similar to that of uraninite.
- **3% Calcite:** <25–200 μm; typically occurs in fractures as a later hydrothermal replacement.
- **2% Galena:** <25–100 μm; disseminated, anhedral, commonly associated with fractures within clay mineralogy.
- **<1% Pyrite:** <25–75 μm; anhedral to subhedral. Occupies fractures between uraninite and mica gangue.
- **<1% Fe-oxide:** <25 μm; anhedral. Medium grey in reflected light, could be hematite; however the crystal habit and alteration of sample would suggest goethite.

For further analysis, see Microprobe section of report.

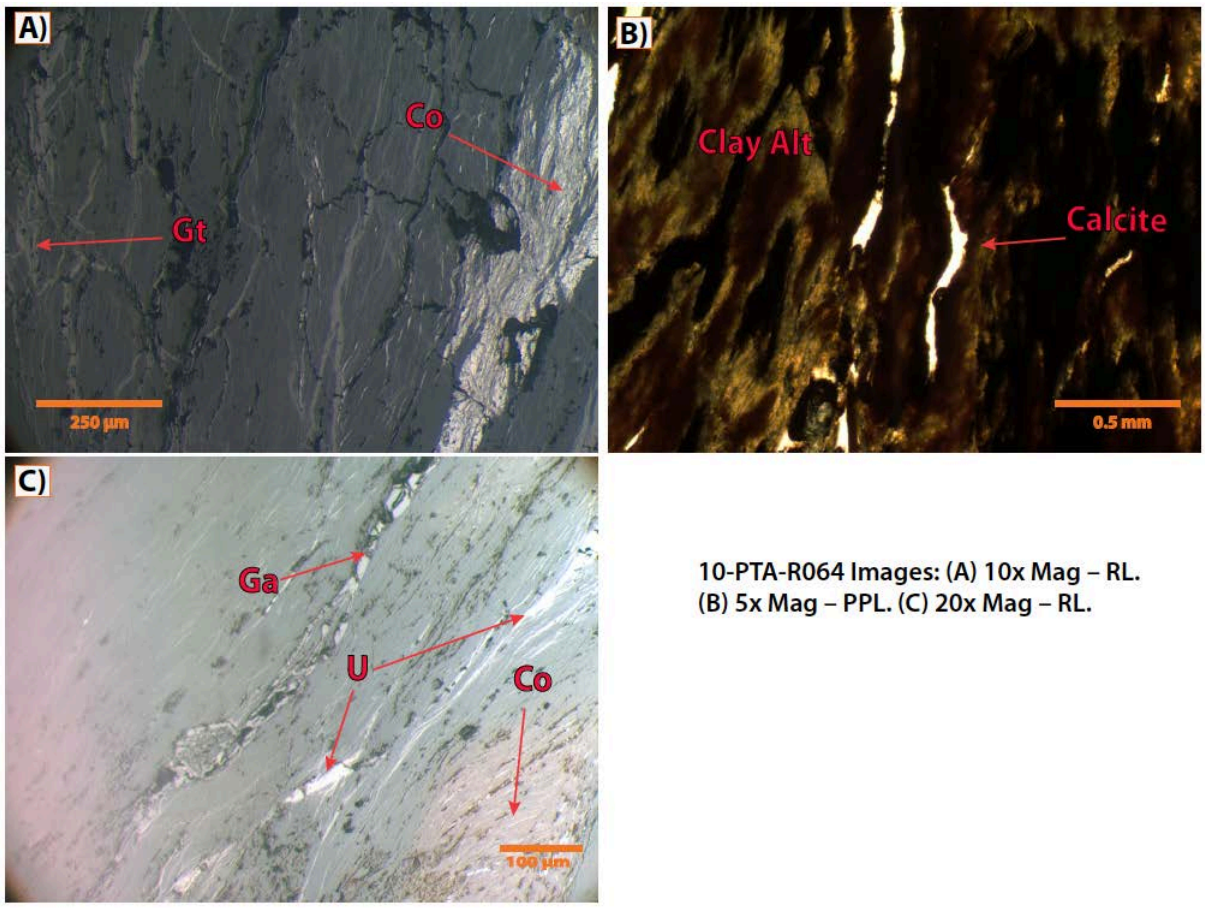


10-PTA-R063 Images: (A) 5x Mag – RL. (B) 5x Mag – PPL. (C) 10x Mag – RL. (D) 5x Mag - RL.

10-PTA-R064

Rock name: Epiclastic rock or metapelite: heavily altered, disseminated uraninite.
Map unit: Pukiq Lake Formation or Pipedream assemblage.
Field relationships: Drill core through KMZ: LG-264, 86.86 m. Photographs of split core in Appendix B.21.
Sample description: Black, to yellow-brown, chalky (completely clay-altered), highly radioactive, metasedimentary rock in which primary minerals are not preserved. Very similar to sample 10-PTA-R063 but with less uraninite and coffinite. Vermiform oxidation front is preserved as transition between dark grey uraninite-rich zone interfingered with yellow-brown Fe-hydroxide zone.
Texture: Fine-grained, foliated metasedimentary rock altered to felted clay minerals and uraninite.
Mineralogy

50% Clay minerals (mica): <25 µm. Hydrothermal alteration has completely altered the shape, size, and form making them almost impossible to distinguish through the microscope. Occurs as brown to greenish brown elongated and oriented felted clusters that record the deformation during alteration.
25% Uraninite: <25–400 µm. (median = 75 µm); infiltrates foliation planes of micas. Medium gray in RL (opaque in transmitted). Disseminated and massive.
15% Coffinite: <25–200 µm. (median = 75 µm) unevenly disseminated; size ranges from <0.1 to 1 mm. Darker grey than the uraninite.
5% Calcite: <25–200 µm. Typically occurs in fractures as a later hydrothermal replacement.
5% Galena: <25–100 µm. Disseminated, anhedral, commonly associated with fractures within clay mineralogy.

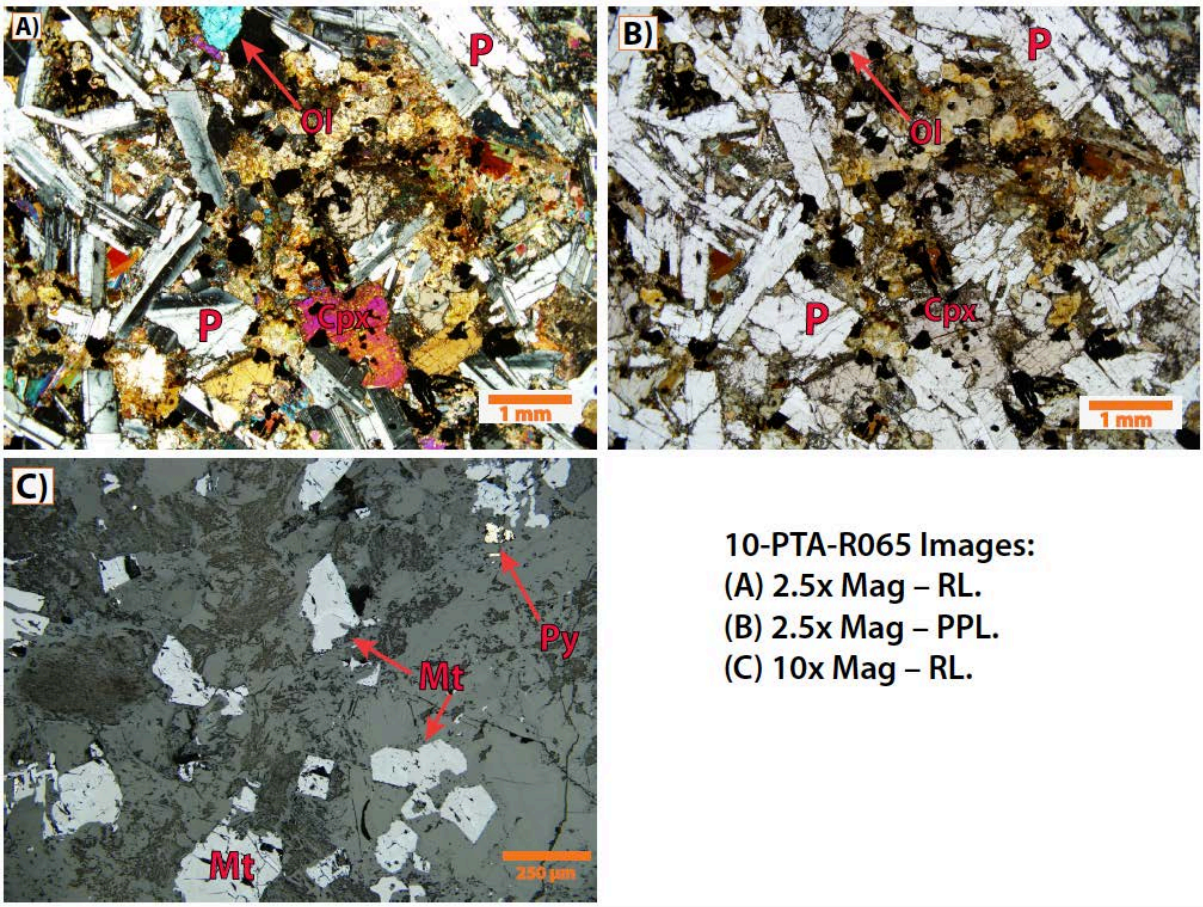


10-PTA-R064 Images: (A) 10x Mag – RL. (B) 5x Mag – PPL. (C) 20x Mag – RL.

10-PTA-R065

Rock name: Diabase.
Map unit: Mackenzie Diabase.
Field relationships: Outcrop of large 155° diabase dyke south of the Thelon Fault, north of Siamese Lake. Coincident magnetic lineament is prominent and shows continuation of the dyke as en echelon segments south-southwest through Siamese Lake well past the map area transecting Baker Lake Basin, as well as north-northwest through Schultz Lake and across the Amer Belt.
Sample description: Dark grey-green, massive, strongly magnetic, unmetamorphosed, hypabyssal intrusive rock. Photograph of polished slab is in Appendix B.21.
Texture: Ophitic: large interlocking plagioclase laths with interstitial clinopyroxene.
Mineralogy:

50% Plagioclase (primarily albite): 0.1–5 mm (median = 2 mm), euhedral, distinct albite twinning, randomly oriented, little to no alteration
40% Clinopyroxene (augite): 0.1–3 mm (median = 1 mm), subhedral to euhedral, blocky, high 2nd order birefringence.
5% Magnetite: 50 μm – 1.5 mm (median = 0.4 mm). Subhedral to euhedral, blocky. Occurs disseminated and within clinopyroxene and olivine crystal structure.
5% Olivine: 0.2–5 mm, partially serpentinized, fayalitic olivine. High, 2nd order, pastel interference colours. Anhedral. Commonly has magnetite growing within its structure.
<1% Chalcopyrite: 25–200 μm (median = 100 μm). Anhedral to subhedral, disseminated.
<1%Pyrite: 25–200 μm (median = 100 μm). Anhedral to subhedral, disseminated.



10-PTA-R065 Images:
(A) 2.5x Mag – RL.
(B) 2.5x Mag – PPL.
(C) 10x Mag – RL.

10-PTA-R072A

Rock name: Agmatite of granodiorite choked with xenoliths of metavolcanic and metasedimentary rocks including basalt, iron formation, and greywacke.

Map unit: Judge Sissons Pluton of Neoarchean Snow Island Suite granodiorite. Agmatite is highly characteristic of this suite. This specific pluton has been dated as 2606 +4/-3 Ma (Roddick, unpublished data, in Hadlari et al., 2004).

Field relationships: Outcrop along the south side of large island in the middle of Judge Sissons Lake. This outcrop shows that the northern boundary of the pluton is located much farther north than mapped by Hadlari et al. (2004).

Sample description: Quartz diorite to granodioritic matrix encloses agmatite with abundant mafic volcanic, metagreywacke, and iron formation xenoliths. Photograph of cut slab is in Appendix B.22.

Texture: Large plagioclase phenocrysts in an interlocking crystalline quartzofeldspathic matrix at the contact with a finely crystalline mafic volcanic xenolith. Felted actinolite is developed along the contact.

Mineralogy

30% Plagioclase: 100 μm – 10 mm. (median = 500 μm). Slightly altered, grains with lower anorthite content (i.e. albite) appear to be more clay altered. Most grains display distinct albite twinning.

30% Quartz: <50 μm – 3 mm. (median = 200 μm). Anhedral, occurs in dense concentrations.

27% Actinolite: <50–750 μm (median = 100 μm). High 2nd order birefringence, pale green to dark green pleochroism, resembles chlorite, however the interference colours are too numerous to list. Anhedral to subhedral, felted clusters and randomly oriented.

5% Hornblende: 100–500 μm. (median = 200 μm). Subhedral, brown to yellow in xpl, green in ppl. Distinct 56-124 cleavage.

5% Chlorite: <50–250 μm. (median = 50 μm. Subhedral, green to dark green, closely associated with altered plagioclase.

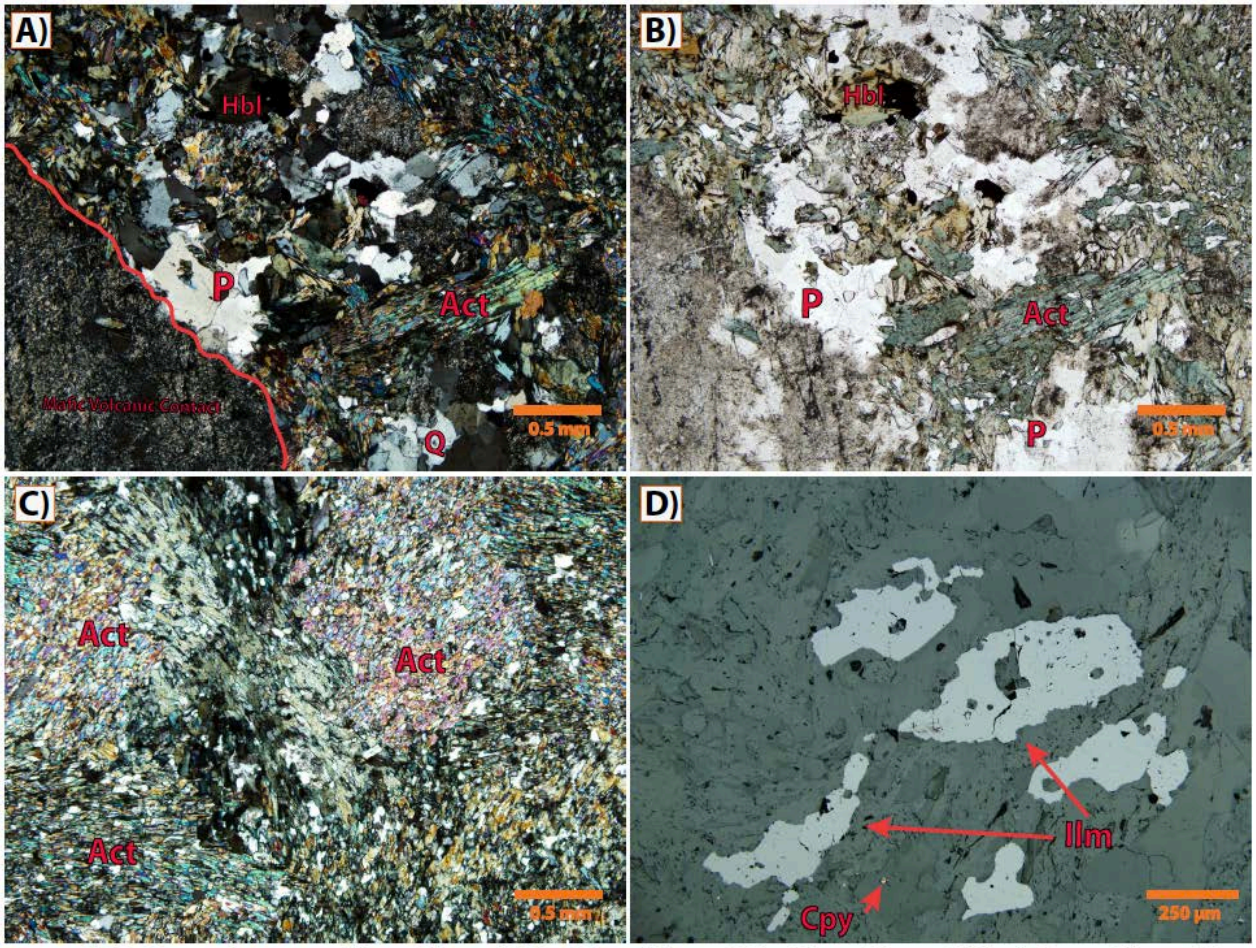
2% Ilmenite (possibly magnetite): 10–250 μm (median = 100 μm). Anhedral to subhedral. Medium cream-grey in RL, disseminated, moderately high relief.

<1%Pyrite: <10–200 μm (median = 50 μm). Disseminated, subhedral, evidence of possible hematite / goethite altering larger pyrite clasts.

<1% Goethite?: <50 μm. Light grey, appears to form rims on pyrite.

<1% Chalcopyrite: <50–100 μm. Subhedral, disseminated.

This sample covers the contact between a quartz diorite matrix and one of many xenoliths of mafic metavolcanic rock. At the xenolith contact, the fine- to medium-grained contact zone is composed mainly of felted actinolite. This sample is part of a broad agmatitic contact zone between the Judge Sissons Pluton and supracrustal rocks of the Woodburn Lake group, and is dominated by iron formation and mafic volcanic rocks.

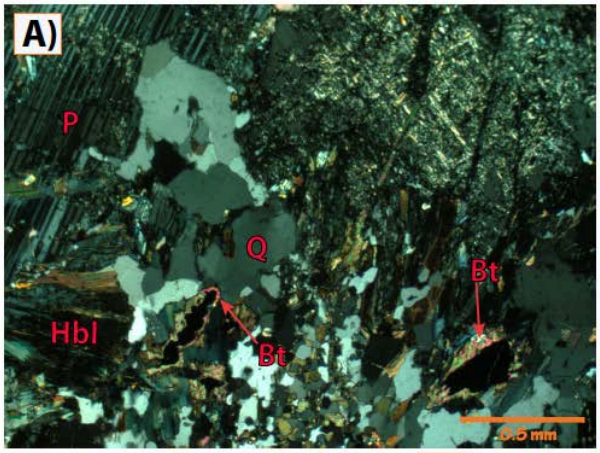


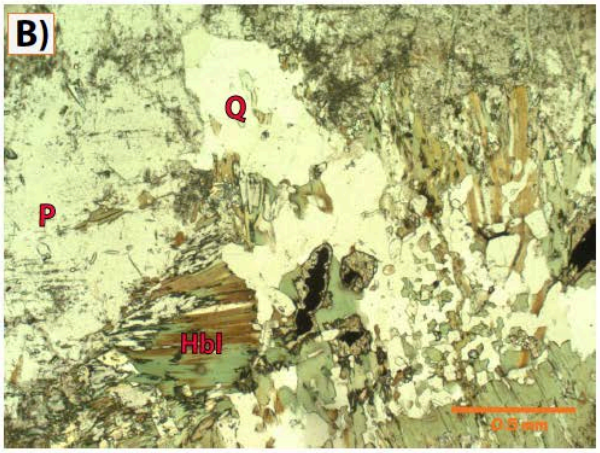
10-PTA-R072a Images: (A) 5x Mag – XPL. (B) 5x Mag – PPL. (C) 5x Mag – XPL. (D) 10x Mag - RL.

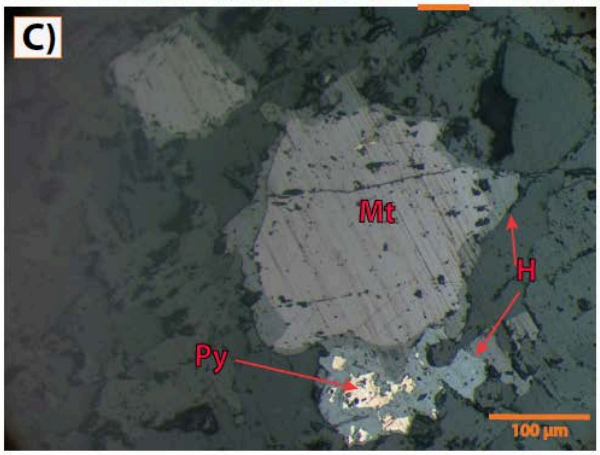
10-PTA-R072B

Rock name: Granodiorite (identical to intrusive phase of R072a without actinolite).
Map unit: Snow Island Suite (2.6 Ga).
Field relationships: Outcrop, south side of large island in the middle of Judge Sissons Lake.
Sample description: Salt-and-pepper appearance with minor green staining (chlorite), coarse-grained plutonic rock with extensive chlorite and minor clay alteration residing in feldspar pseudomorphs. Local envelopment of feldspars by phyllosilicate minerals, illustrating minor contact metamorphism. Photograph of cut slab in Appendix B.22.
Texture: Coarse-grained interlocking primary magmatic minerals (plagioclase, quartz, amphibole) with secondary anhedral to subhedral alteration products.
Mineralogy:

- **35% Plagioclase:** 0.25– 3 mm (average = 1 mm), anhedral to subhedral, distinctive albite twinning, 50% of grains are heavily altered by clay minerals. Some crystals display myrmekitic texture.
- **25% Hornblende:** 0.25–3.5 mm (median = 2 mm), anhedral to subhedral, poikilitic with inclusions of other phases listed below. Yellow to brownish yellow in XPL. Biotite and chlorite grains occupy fractures within and partly replace large crystals (labelled as Hbl labelled in photomicrographs), which are 50% replaced by chlorite.
- **20% Quartz:** 0.25–3 mm (median = 0.5 mm), distinct undulatory extinct, appears to truncate many plagioclase crystals.
- **5% Biotite:** 0.25–4 mm (median = 1.5 mm), subhedral. Pleochroic haloes are common within the larger grains, where there is also common alteration to chlorite. Small inclusions of magnetite and possibly tourmaline are also within the large biotite crystals. Magnetite is rimmed by hematite. Grains are randomly oriented, illustrating that they have not undergone much, if any, metamorphism.
- **5 % Chlorite:** 50 μm – 2 mm (median = 1 mm), subhedral to euhedral. Partially to wholly replaces biotite and hornblende.
- **5% K-feldspar:** 0.25–3 mm (median = 2 mm), anhedral to subhedral.
- **3 % Magnetite:** <0.1–1 mm (median = 0.25 mm), subhedral, medium grey. Hematite rims are ~10 μm thick. Disseminated within and beside biotite and hornblende.
- **1% Pyrite:** <10–100 μm, pale yellow, very finely disseminated.
- **<1% Hematite:** <50 μm, forms alteration rims around magnetite and pyrite grains.
- **<1% Zircon:** ~200 μm, anhedral, high birefringence. Included by biotite.







10-PTA-R072b Images:
(A) 5x Mag – XPL.
(B) 5x Mag – PPL.
(C) 20x Mag – RL.

10-PTA-R073

Rock name: Iron formation: banded sulphide-magnetite-silicate facies.

Map unit: Sulphide-rich lens within magnetic iron formation in the Halfway Hills assemblage of the Woodburn Lake group.

Field relationships: Outcrop in the middle of a large island within Judge Sissons Lake, coincident with significant linear aeromagnetic anomaly.

Sample description: Rusty brown-weathered, bedded at mm to cm scale, nonmagnetic to locally very weakly magnetic metasedimentary rock. Photograph of cut slab in Appendix B.23.

Texture: Finely crystalline, weakly foliated.

Mineralogy:

75% Grunerite: (SEM confirmed by ODM) : 200–500 μm (median = 250 μm). Acicular, medium-grained, greenish – brown in XPL. Can be mistaken for hornblende.

10%: Almandine: 2–5 mm. Forms metacrysts concentrated in a single 1 cm thick band with intermixed coarse-grained biotite.

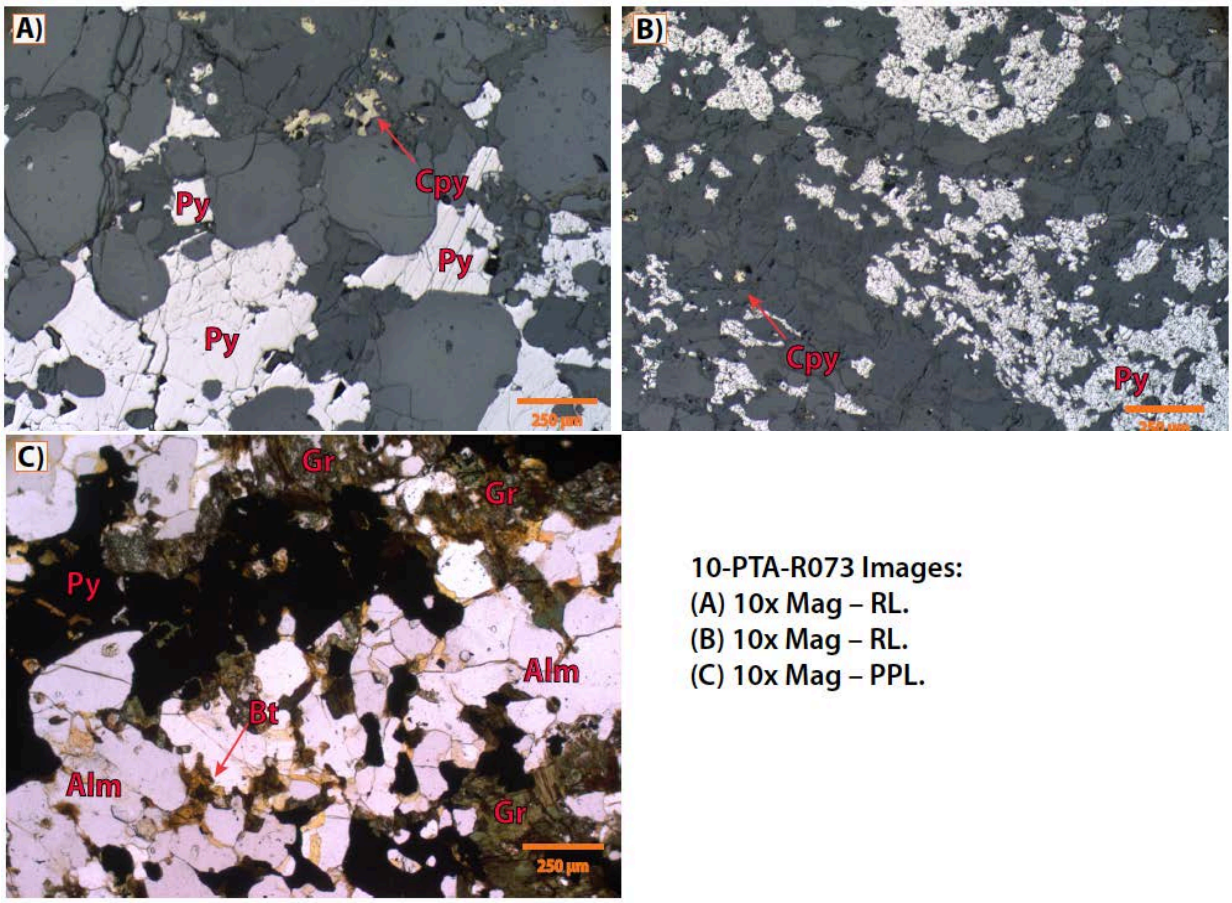
10% Pyrite: 25–600 μm (median = 150 μm). Subhedral, recrystallized, fine- to medium-grained, mostly disseminated in grunerite with concentration increasing near fracture intersections.

2% Biotite: 25–300 μm (median = 200). Subhedral, elongated, and weakly oriented parallel to foliation; occurs in band with almandine.

1% Chalcopyrite: <25–150 μm (median = 75 μm), anhedral; occurs disseminated and along minor fractures in association with pyrite.

Tr Magnetite: <100 μm, localized, very faint amount. Occurs interstitially in grunerite.

<1% Hematite: <25–100 μm (median = 25 μm). Occurs as an inclusion in some pyrite grains.



10-PTA-R073 Images:
(A) 10x Mag – RL.
(B) 10x Mag – RL.
(C) 10x Mag – PPL.

10-PTA-R138

Rock name: Minette (lamprophyre) dyke, altered.
Map unit: Intrusive phase of the Christopher Island Formation, Baker Lake Group.
Field relationships: Drill core through the Andrew Lake deposit: AND-10-3, 246 m. This is a dyke cutting granite and metasedimentary rock, all of which are affected by the alteration zone of the Andrew Lake uranium deposit. Photographs of core and cut slab are in Appendix B.23.
Sample description: Heavily altered, salmon red, equigranular, finely crystalline, hypabyssal intrusion with relict feldspar and mica pseudomorphed by clay minerals and patchy chlorite.
Texture: Finely crystalline, equant, undeformed. Commonly randomly oriented phenocrysts of a highly altered tabular mineral (highly altered biotite or pyroxene) are evenly distributed.
Mineralogy:

50% K-feldspar: <50–350 μm (median = 150 μm), tabular, anhedral to subhedral. Crystal form is intact; however the interiors are highly clay-altered. Interpreted as K-feldspar due to lack of twinning.

5% Plagioclase: <50–250 μm (median = 100 μm), tabular, anhedral. Crystal shape is intact, however less so than K-feldspar. Albite twinning is present where there is less alteration to clay minerals.

5% Chlorite: <50–500 μm (median =150 μm). Platy to felted masses concentrated as replacements of tabular mafic mineral, which are interpreted to be either amphibole or biotite. Also present adjacent to clay-altered feldspar.

10% Mica: <50–300 μm (median = 100 μm). Tabular, randomly oriented, highly altered to chlorite; interpreted as biotite or phlogopite.

10% Sericite and other clay minerals: <50 μm. Low 2nd order birefringence; occurs as alteration products and as matrix throughout the sample.

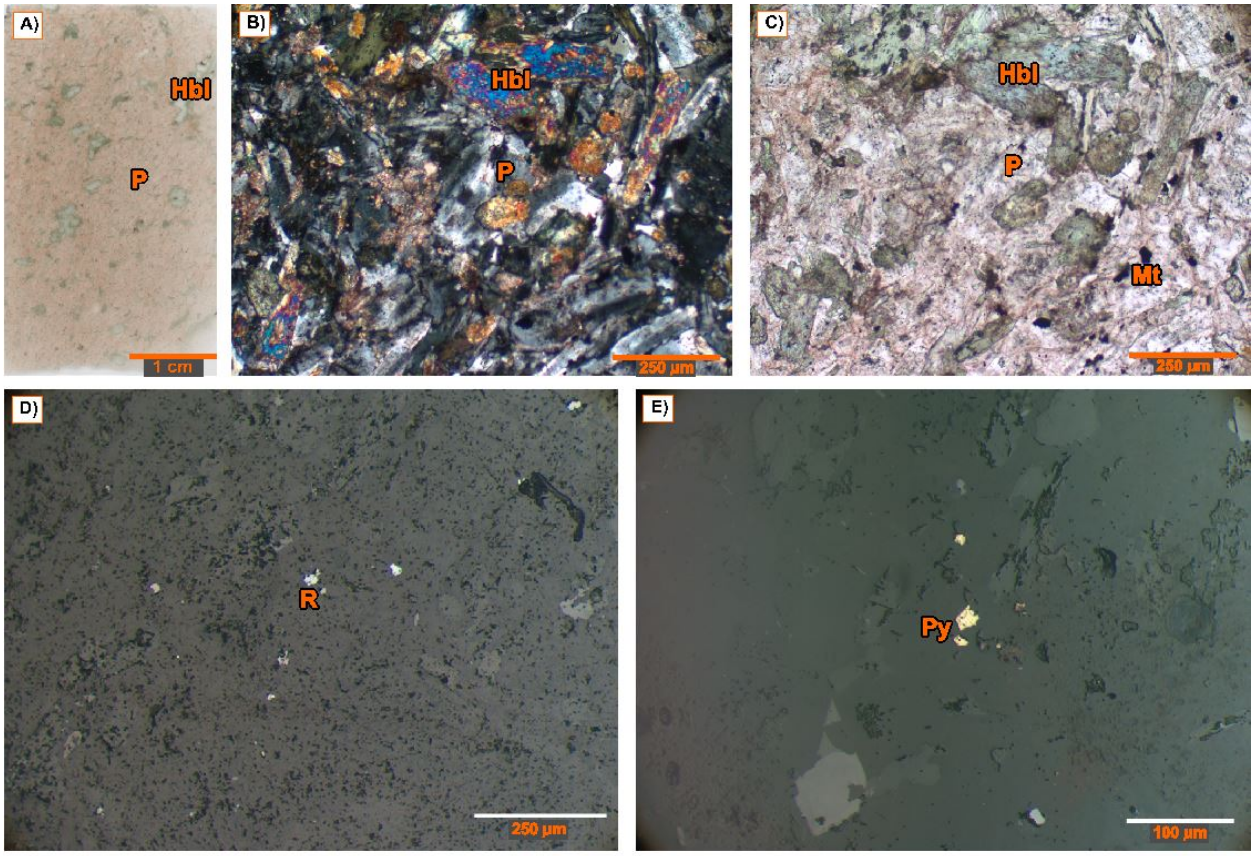
8% Hornblende (amphibole): 100 –300 μm (median = 250 μm). Distinct 124-56 cleavage, yellowish in XPLl; green and pleochroic in PPL. Crystals are typically subhedral.

<1% Pyrite: <10–100 μm, finely disseminated.

<1% Rutile: <10–150 μm, light to medium gray, not completely opaque.

<1% Chalcopyrite: <10–60 μm (mediaan = 40 μm), finely disseminated and commonly occurs along grain boundaries of pyrite.

<1% Gold: not observed petrographically but recovered.

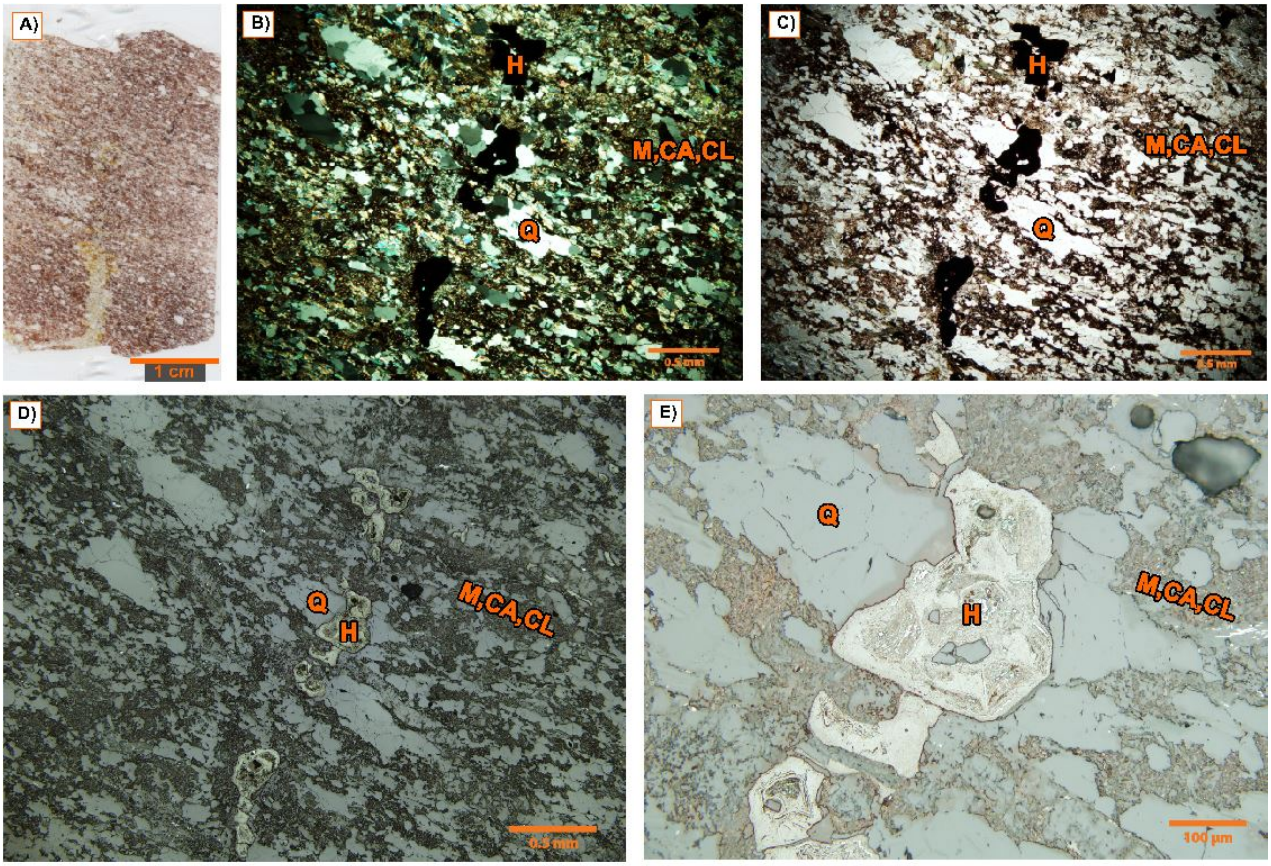


10-PTA-R138 Images: A) thin section scan. B) 10x Mag – XPL. C) 10x Mag – PPL. D) 10x Mag – RL E) 20x Mag – RL

10-PTA-R139

Rock name: Epiclastic or fine metagreywacke; hematite and clay-altered.
Map unit: Pukiq Lake Formation or Pipedream assemblage
Field relationships: Drill core through the Centre Zone of the Kiggavik deposit: CZ-07-01, 16.2 m. No photographs in Appendix B.
Sample description: Reddish brown, fine-grained metasediment that has been highly altered (mainly hematite alteration) with multiple generations of hematite.
Texture: Overall fine grained with common polygonised and highly flattened, large quartz clasts, all highly foliated and recrystallized.
Mineralogy:

- **35% Quartz:** <25 μm – 2 mm (median = 200 μm);anhedral, elongated, and slightly deformed with rounded edges; flattened parallel to foliation. Secondary thin 100 μm thick quartz veins runs through the section.
- **25% Clay minerals:** <25 μm, non-identifiable; wrap around quartz and feldspar grains and are commonly hematitized.
- **15% Muscovite / Sericite:** <25–300 μm (median = 200 μm); subhedral to euhedral, blockier than other micas observed throughout deposit. Altered to kaolinite near quartz veining. Oriented parallel to foliation.
- **10% Alkali Feldspar:** 50 μm – 1.5 mm (median = 300 μm); anhedral to subhedral, commonly weathered to sericite and/or kaolinite.
- **8% Hematite:** <50 μm. Generally disseminated throughout the clay-chlorite-altered micaceous matrix to impart a deep red colour; concentrated along some foliation laminae and in relict diffuse veins where, with rutile, it pseudomorphs pyrite.
- **5% Chlorite:** 50–300 μm (median = 200 μm); subhedral, elongated. Strong green pleochroism.
- **2% Rutile??** 50–300 μm (median = 150 μm); subhedral to euhedral, yellowish grey, with brown in RL. Pseudomorphs pyrite where it demarks previous euhedral crystal zones.

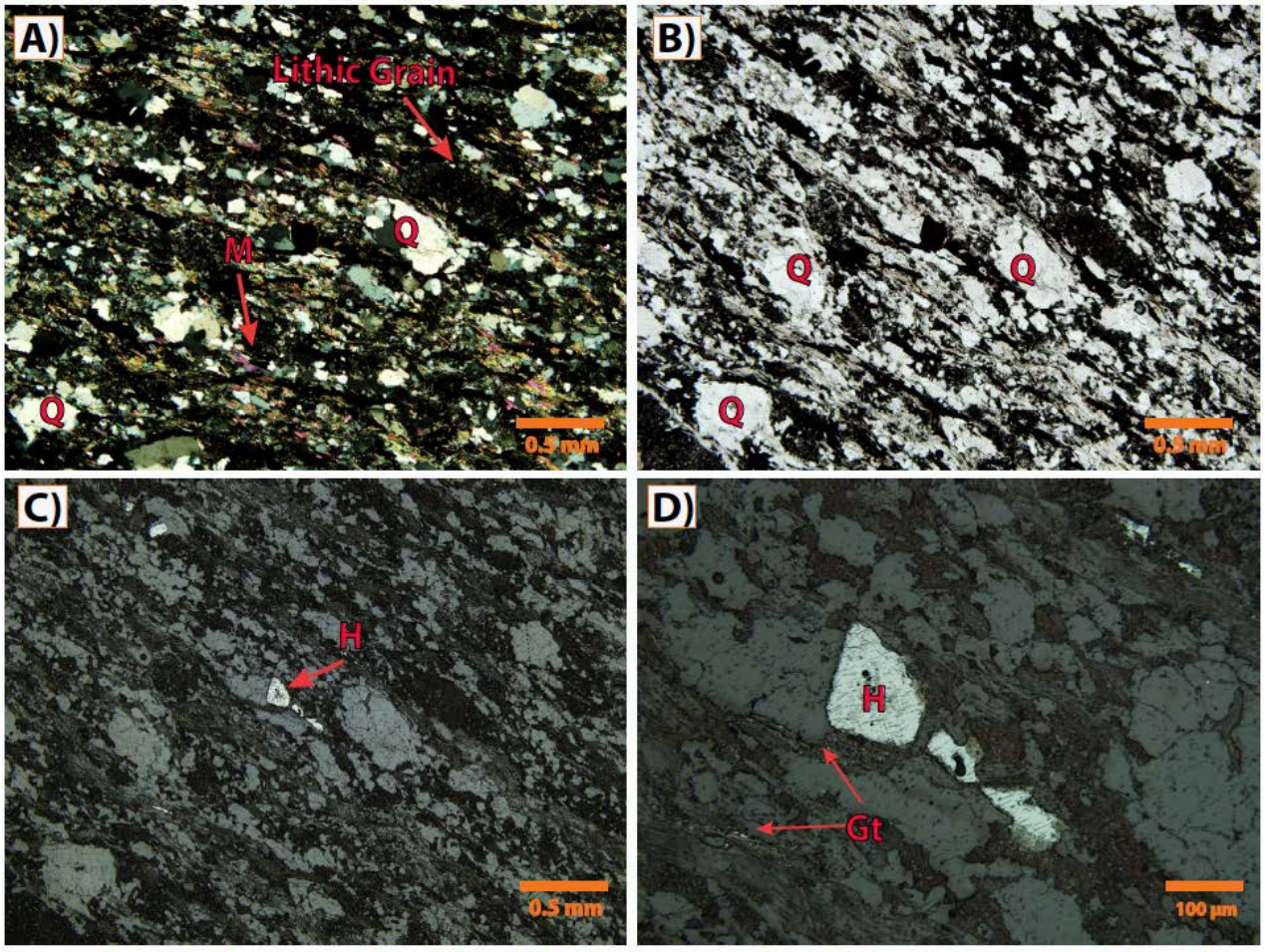


10-PTA-R139 Images: A) thin section scan. B) 5x Mag – XPL. C) 5x Mag – PPL. D) 5x Mag – RL. E) 20x Mag – RL

10-PTA-R140

Rock name: Epiclastic rock; hematite and clay altered.
Map unit: Pukiq Lake Formation.
Field relationships: Drill core through Kiggavik Centre Zone: CZ-07-01, 16.65 m. This is the first in a sequence (through to 10-PTA-R143, inclusive) that shows degrees of alteration. This series of rocks when observed in the field was thought to be altered metagreywacke and metapelite of the Pipedream assemblage, but the petrographic indications of phenocrysts support reinterpretation of this sequence as largely rhyolite and epiclastic rock of the Pukiq Lake Formation.
Sample description: Reddish brown, highly hematitized, and clay-altered metasedimentary or epiclastic rock; thought in the field to be possibly greywacke. The high content of clay minerals and hematite suggested greywacke in the field description, but the relict phenocrysts record a volcanic origin; hence the term epiclastic and tentative assignment herein to the Pukiq Lake Formation. Neither hand-specimen photograph nor binocular descriptions were undertaken.
Texture: Foliated, fine–grained, with some large flattened quartz phenocrysts. Finely crystalline phases (clay minerals, chlorite, and abundant hematite) are concentrated along foliation planes that are slightly bent around larger polygonized quartz grains that are interpreted as flattened phenocrysts. Late fractures.
Mineralogy:

- **45% Quartz:** 25 μm – 1.5 mm (median = 150 μm); anhedral, subrounded to subangular, elongated, oriented parallel to foliation, distinct undulose extinction.
- **25% Clay alteration:** <25 μm; anhedral, lower birefringence than typically observed in the Kiggavik clay alteration zone, probably as a result of obscuration by the abundant hematite.
- **15% Feldspar (relict):** 100 μm – 1 mm (median = 300 μm); subhedral, however all of the grains have been entirely altered and only their relict crystal form (some interpreted as phenocrysts) remains. Most are highly illitized.
- **15% Muscovite / Sericite:** <25–300 μm (median = 200 μm); subhedral to euhedral, high birefringence, oriented parallel to foliation, and typically wraps around large quartz grains.
- **5% Hematite:** <25–200 μm (median = 100 μm); anhedral to subhedral. Two distinct phases of hematite are distinguishable: one appears to be a coating on detrital grains, whereas the other occupies veins associated with clay alteration. Red tints are observed in XPL.

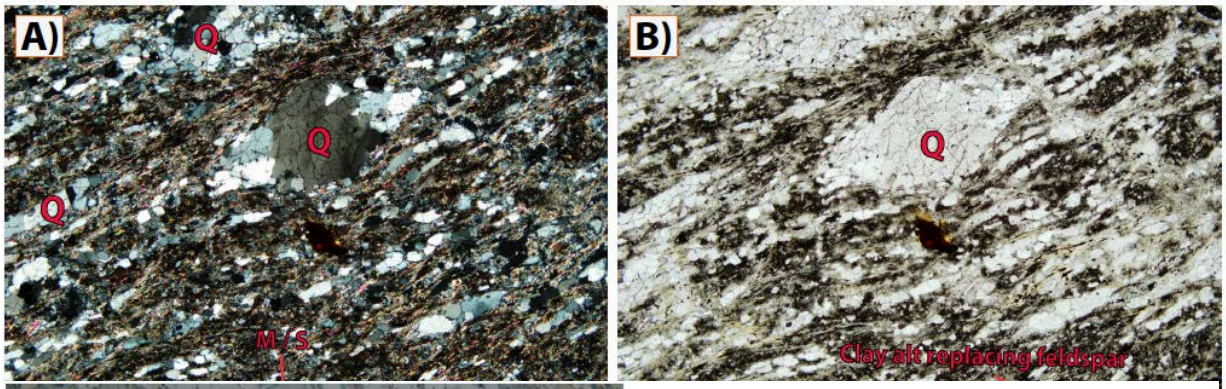


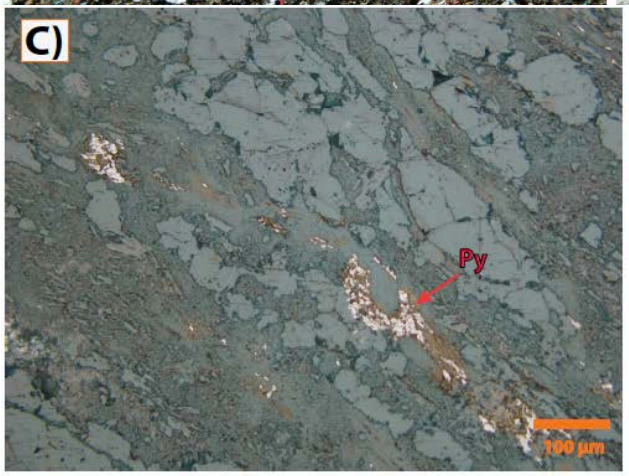
10-PTA-R140 Images: (A) 5x Mag – XPL. (B) 5x Mag – PPL. (C) 5x Mag – RL. (D) 20x Mag - RL.

10-PTA-R141

Rock name: Rhyolite, quartz porphyritic, highly strained and altered.
Map unit: Pukiq Lake Formation.
Field relationships: Drill core through Kiggavik Centre Zone: CZ-07-01, 18 m. Second sample in alteration sequence transition from 10-PTA-R140 to -R143. Very similar to sample 10-PTA-R140, but has greater clay content. Photograph of a small piece of core in Appendix B.25.
Sample description: Whitish yellow and chalky as a result of extreme illite/clay alteration.
Texture: Fine- to medium-grained, foliated, elongated phenocrysts (quartz/feldspar), polygonized, fractured, and cut by secondary quartz veinlets.
Mineralogy:

- **45% Quartz:** <50 μm – 2.5 mm (median 150 μm); recrystallized phenocrysts, anhedral, flattened parallel to foliation and elongated. Finely polygonized quartz is also segregated into layers alternating with clay-altered muscovite.
- **28% Clay alteration** (hand sample appears to be mainly illite): <25 μm; felted, unidentifiable, darkened by hematite with small patches of high-order interference colours. Appears to have consumed all the primary minerals with the exception of quartz and a few feldspar grains.
- **20% Muscovite:** 50– 100 μm (median = 100 μm); subhedral, felted clusters, oriented parallel to foliation and appears to be secondary as it wraps around quartz and feldspar grains.
- **5% Alkali feldspar:** <50–1.5 mm (median = 150 μm); subhedral, minor twinning is visible. Commonly altered; sharp mineral boundary.
- **3% Lithic fragments:** 300 μm – 2 mm (few grains); dullish brown; rounded grain boundary; wrapped around by micaceous minerals.
- **2%Pyrite:** <25–200 μm (median = 50 μm); anhedral to euhedral; commonly anhedral. Occurs predominantly in clay mineral banding and is also disseminated.
- **<1% Hematite/Goethite:** <50 μm; irregular; typically occurs along clay alteration boundaries.



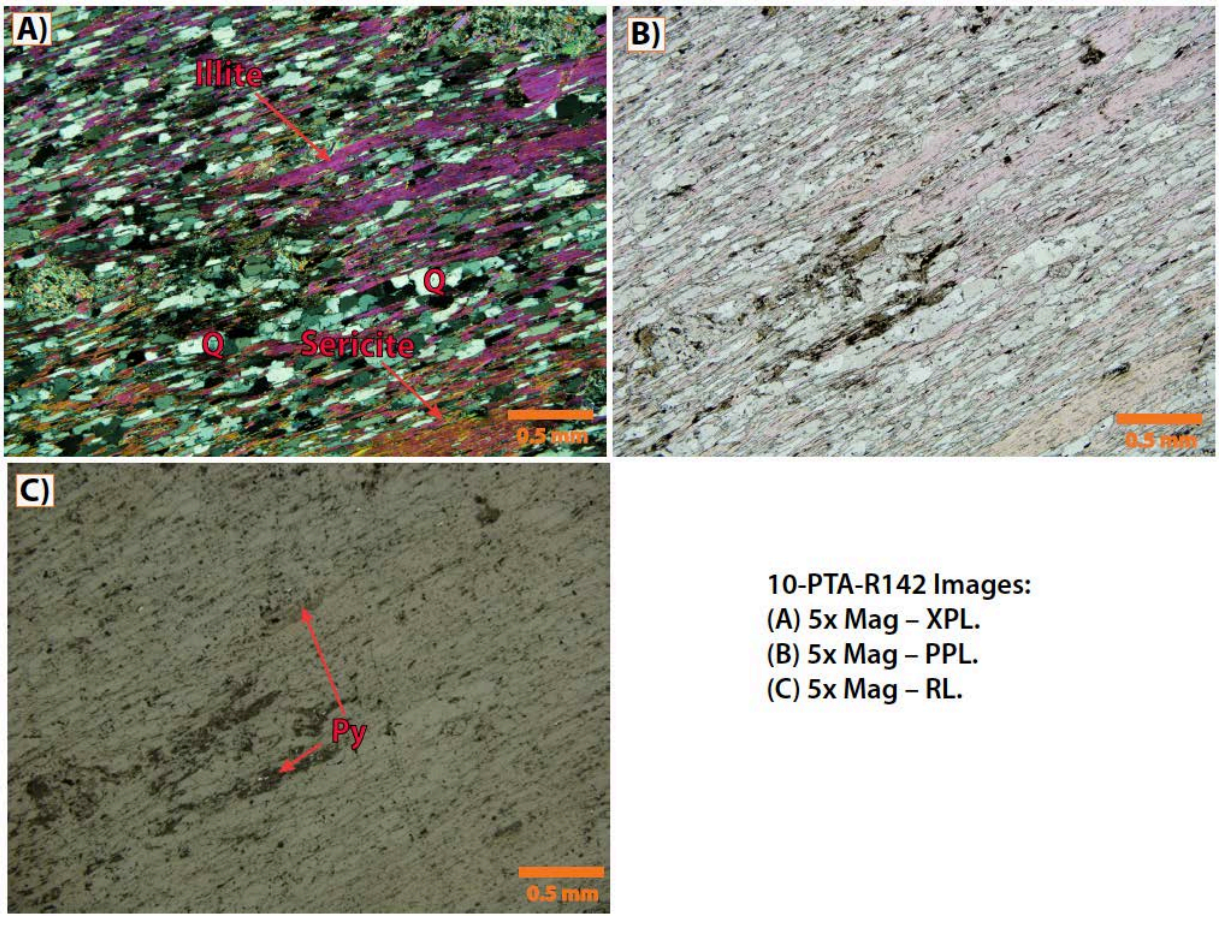


10-PTA-R141 Images:
(A) 5x Mag – XPL.
(B) 5x Mag – PPL.
(C) 20x Mag – RL.

10-PTA-R142

Rock name: Rhyolite: highly strained and altered.
Map unit: Pukiq Lake Formation.
Field relationships: Drill core through Kiggavik Centre Zone: CZ-07-01, 23.2 m.
Sample description: Whitish yellow, heavily altered metarhyolite. Some fractures infilled with yellowish (illite?) alteration. Original minerals other than quartz are not present. Pale, bleached appearance; pale yellow limonite along late fractures. Photograph of individual core sample in Appendix B.25.
Texture: Fine-grained, highly foliated with elongated and flattened quartz grains interlayered with muscovite-rich foliation laminae. Phenocrysts of quartz are polygonized; phenocrysts of feldspar are altered to sericite and illite.
Mineralogy:

60% Quartz: 25–300 μm (median = 100 μm); anhedral, elongated, and stretched; interlayered with clay alteration minerals.
35%: Clay alteration minerals: Mainly Illite? Very fine grained. Micaceous bands are all connected, indicating extreme alteration. Birefringence is high 3rd order, and fluctuates from bluish yellow to pinkish purple. One end of the section has micas displaying yellow-blue interference colours, transitioning into purple-pinkish, and then pinkish orange. This transition is likely due to a change in the dominant clay-alteration mineral.
5% Sericite: <50 μm; patchy replacement of feldspar crystals. C have high 2nd order birefringence.
<1% Pyrite: <10–25 μm; anhedral to subhedral; disseminated.
<1% Hematite: <10– 50 μm; very fine-grained, disseminated, forms rims on pyrite.

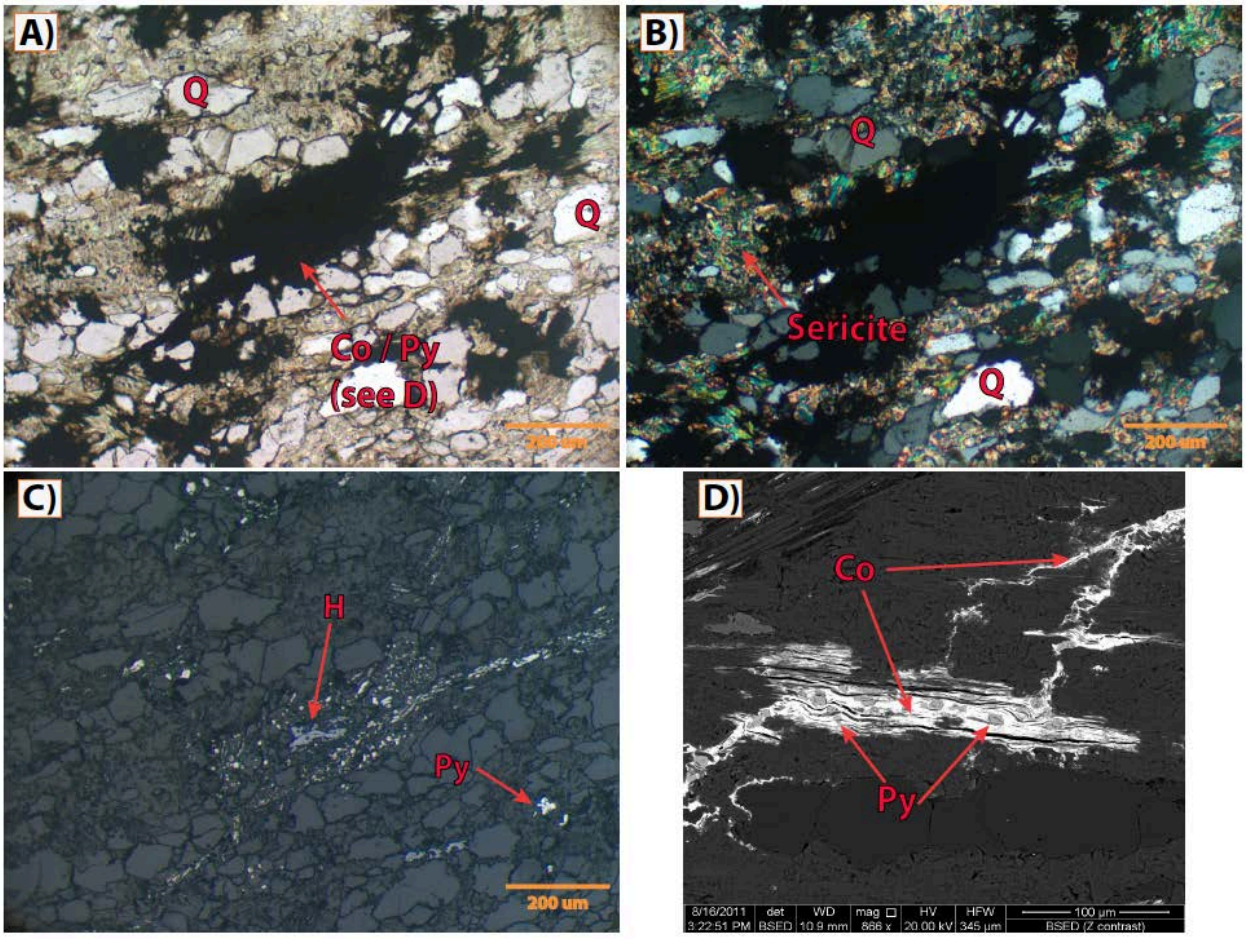


10-PTA-R142 Images:
(A) 5x Mag – XPL.
(B) 5x Mag – PPL.
(C) 5x Mag – RL.

10-PTA-R143

Rock name: Rhyolite or epiclastic rock; highly deformed, intensely altered; minor uraninite.
Map unit: Pukiq Lake Formation.
Field relationships: Drill core through Kiggavik Centre Zone: CZ-07-01, 24.4 m. In the sequence of samples 10-PTA-R140 to -143, this is the most altered and the only one to contain uraninite. The core photograph in Appendix B.26 shows that the rhyolite or epiclastic rock is finely intercalated with thin lenses to layers of quartzite, here interpreted as tectonic based on 3-D field relationships that show intercalation at the interface between the larger quartzite and rhyolite map units, for example, station 10PTA-R012 (same as 10JP020 and 10-JPM-095), which was revisited by many of the northeast Thelon project team researchers and collaborators over several years.
Sample description: Foliated and slightly fractured, whitish yellow to brownish yellow metasedimentary rock. Later quartz vein cuts through the sample and fractures are typically infilled with isotropic and opaque mineral phases, which are possibly pyrite, hematite, and uraninite.
Texture: Fine-grained foliated metasedimentary rock with sutured 50 μm quartz grains and clay alteration. The finely crystalline quartz grains are equant but occur in strings within altered a clay-hematite matrix and therefore could represent recrystallized polygonized grains after early highly strained phenocrysts.
Mineralogy:

- **45% Quartz:** <25–400 μm: (median = 150 μm); elongated, oriented parallel to foliation, and mildly sutured from low-grade metamorphism. Strong undulose extinction.
- **50% Clay alteration minerals:** <25 μm, typically less than 5 μm (clay-sized); appears to be dominated by sericite, with the larger grains being muscovite. Some minor kaolinite. Alteration has consumed all of the feldspar.
- **2% Pyrite:** <25–200 μm (median = 75 μm); anhedral to subhedral. Located along minor fractures and disseminated throughout the thin section. Closely associated with coffinite.
- **3%** Coffinite (SEM discovered): <25–200 μm; anhedral, irregular, replaces original mica minerals; occurs with pyrite and within fractures. Locally forms rims on pyrite.
- **<1% Hematite?? (probably limonite):** 50–200 μm: (median = 100 μm); anhedral. Appears to replace primexhibit hematite habit.
- **1% Rutile :** <25–150 μm (median = 50 μm); subhedral. Appears to be slightly opaque, yet has high spotty birefringence at high magnification.



10-PTA-R143 Images: (A) 10x Mag – PPL. (B) 10x Mag – XPL. (C) 10x Mag – RL. (D) SEM image of pyrite and coffinite.

10-PTA-144

Rock name: Metagreywacke, fresh.
Map unit: Pipedream assemblage.
Field relationships: Drill core through KMZ: MZ-09-02, 224.6 m.
Sample description: Light grey, foliated, fine- to medium-grained metagreywacke with metamorphic biotite and little alteration. See photographs of core in Appendix B.27.
Texture: Fine- to medium-grained, fresh, interlocking metamorphic crystals, foliated.
Mineralogy:

35% Quartz: <100 µm to 1.0 mm (median = 0.2 mm); anhedral to subhedral, weakly foliated and is the dominant framework mineral of this metasediment. Quartz grains also displaying minor suturing.

30% Plagioclase / Undifferented lithic grains. <100 µm to 2 mm (median = 0.2mm); anhedral to subhedral, tabular. Some grains display weak albite twining. Minor evidence of recrystallization of lithic grains.

20% Biotite: 50 –700 µm (median = 250 µm); subhedral, elongated, and strongly foliated. Wraps around some quartz grains.

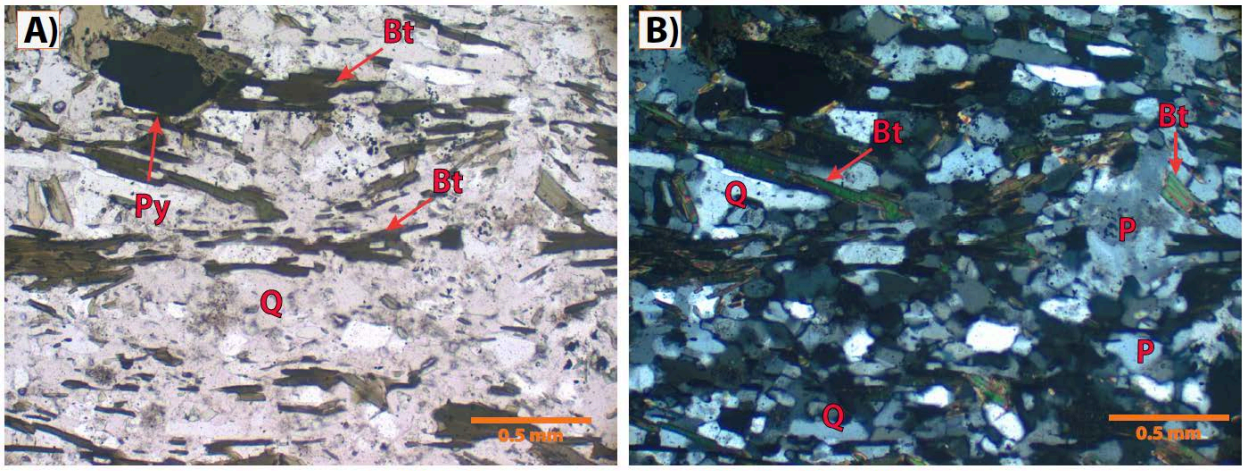
5% K-feldspar: 0.1–0.5 mm (median = 0.2 mm); subhedral, elongated, minor alteration to kaolinite?

5% Chlorite: 75–300 µm (median = 100 µm); anhedral to subhedral. Occurs mainly along biotite grains and in fine-grained groundmass.

3% Pyrite: <20–200 µm (median = 100 µm); subhedral to euhedral, disseminated. About 25% of the grains are rimmed by other minerals, such as possibly titanite.

<1% Titanite: <10–300 µm (median = 100 µm); anhedral. Light brown in XPL and PPL; not opaque. Rims many pyrite grains.

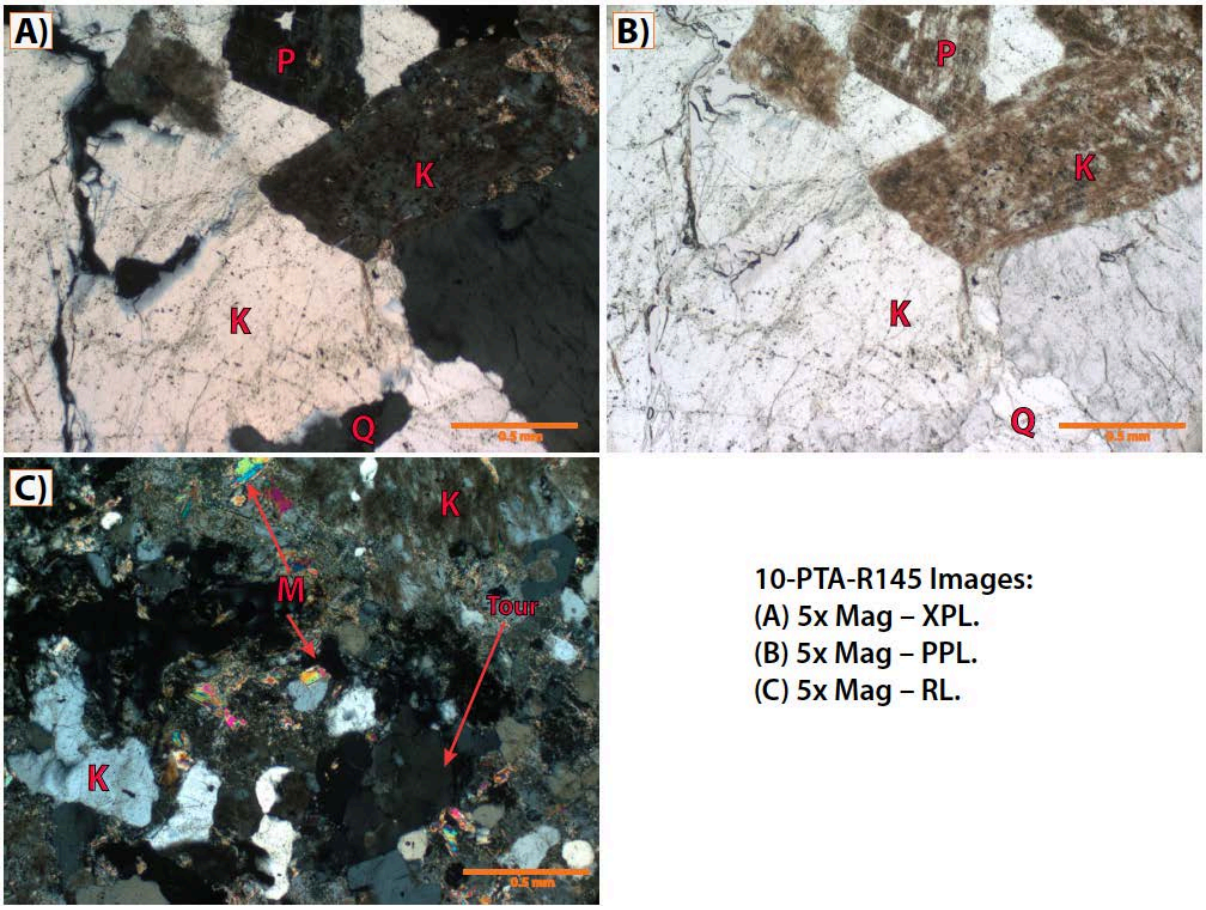
<1% Chalcopyrite: <10 µm; anhedral, finely disseminated. Difficult to distinguish from pyrite.



10-PTA-R144 Images: (A) 5x Mag – PPL. (B) 5x Mag – XPL.

10-PTA-R145

Rock name: Granitic Pegmatite and aplite dyke.
Map unit: Hudson Suite.
Field relationships: Outcrop of dyke about 5 m across, which trends northerly about 100 m southwest of the KMZ trench (station 10-PTA-117) and 22 m west of station 10-PTA-R009A, B.
Sample description: Light pink to white with blebs of black, coarse-grained felsic plutonic rock with K-feldspar, quartz, plagioclase, and tourmaline. Photograph of rough surface is in Appendix B.27.
Texture: Extremely coarsely crystalline interlocking, undeformed.
Mineralogy:
55% K-feldspar: 0.3–8 mm (median =1 mm); subhedral to anhedral. Slightly to heavily altered; commonly brown in PPL. No microcline twinning.
20 % Quartz: 0.2–6 mm (median = 1mm); subhedral to anhedral. Frayed boundaries with feldspars.
15% Plagioclase (albite): 0.1–5 mm (median 0.8 mm); subhedral. Moderately to heavily altered; displays some albite twining.
5% Tourmaline: 0.5–1 mm (median 0.8mm). Very dark, commonly appears isotropic in XPL.
5% Muscovite: <0.1–0.5 mm; subhedral. Found between boundaries of quartz and feldspar crystals. High birefringence.



10-PTA-R145 Images:
(A) 5x Mag – XPL.
(B) 5x Mag – PPL.
(C) 5x Mag – RL.