

Open File 7771, Appendix C

Binocular Microscope Description of a Suite of Hand Specimens and Drill Core Samples  
from Kiggavik Uranium Deposit, Nunavut

For Roger Paulen, GSC

Reformatted but otherwise unchanged from contract report by S.A. Averill dated September, 2011.

- 10-PTA-R005 SHEARED METAGREYWACKE. Hand specimen. Hematitized brick red, strongly foliated and lineated, nonmagnetic, elastic metasediment, pervasively fractured to brecciated at 0.5 to 10 mm scale. Metasediment consists of 70% shear-stretched, undifferentiable quartz, plagioclase, and lithic grains of medium to coarse sand size (0.3–1 mm) enveloped by 30% pervasively hematite-stained biotite. Fracturing and brecciation overprint (post-date) foliation. Breccia is cemented by mylonite and fractures are infilled by similar mylonite or, locally, by aphanitic silica veinlets up to 1 mm wide. Also present are 0.5% younger, crosscutting, 0.5 to 1 mm wide white quartz (SEM confirmed; no albite) veinlets.
- 10-PTA-R012 SHEARED PORPHYRITIC LEUCOGRANITE (now recognized as mylonitized rhyolite). Drill core. Pale pink to buff yellow with brick-red, hematite-stained streaks, schistose, porphyritic, probably subvolcanic intrusive rock consisting of 5% stretched, 1.5–5 mm long quartz augen porphyroclasts and 5% similarly sized lozenges of leucogranite identical to the groundmass phase of Sample 060 (i.e. 0.5 mm graphic-textured quartz and alkali feldspar with just 3% biotite) in an aphanitic, mylonitized buff-coloured, quartzofeldspathic matrix containing 10% sericite. Note: Crevices on sawn and polished surface of drill core are contaminated with polishing powder.
- 10-PTA-R020 SANDSTONE. Hand specimen. Brick red (hematite-stained), well sorted, coarse-grained (0.5–2 mm), slightly gritty (1% coarser, 2–5 mm granules), physically and chemically mature, unmetamorphosed but broadly fractured clastic sediment consisting of 60% rounded quartz sand grains, 10% clay altered feldspar or lithic grains, 2% specular hematite as finer (0.2–0.5 mm) rounded, detrital grains, <0.1% other detrital heavy mineral grains (mainly leucoxene, rare zircon), 30% hard, red jasperoid silica cement, 5% soft, white clay cement (very localized). Note: polishing powder resembling marcasite is embedded in fractures on sawn and polished surface of sample.
- 10-PTA-R026A SYENITE. Hand specimen. Dark pink, massive, moderately magnetic, porphyritic intrusive rock consisting of 5%, locally oikocrystic, variably chloritized or amphibolitized, 3–8 mm clinopyroxene phenocrysts (SEM = diopside) in a medium grained (0.5–1 mm), quartz-free groundmass consisting of 80% perthitic (string-type)

K-spar, 15% diopside, 5% biotite, 2% magnetite and 0.05% fine-grained (0.2 mm) pyrite.

- 10-PTA-R032 METAGREYWACKE. Hand specimen. Dark grey, moderately foliated, nonmagnetic, elastic metasediment consisting of 60% slightly recrystallized, undifferentiable plagioclase/lithic grains and 10% quartz grains of medium to coarse sand size (0.3–1 mm), rare lithic granules up to 4 mm, 30% biotite and 1% fine grained (0.05–0.3 mm), disseminated, variably granular to cubic, syngenetic to diagenetic pyrite.
- 10-PTA-R041 GRANITE. Drill core. Pink, massive, nonmagnetic, coarse-grained (1–4 mm), plutonic intrusive rock consisting of 20% subhedral, saussuritized and sericitic (buff-coloured, variably soft to hard) plagioclase crystals, 45% subhedral, perthitic (patchy type), fresh (hard throughout), patchy white to orange-pink (hematite-stained) alkali feldspar crystals, 35% quartz, 1% biotite, trace leucoxene, trace medium-grained (0.5–1 mm) interstitial pyrite and rare trace molybdenite.
- 10-PTA-R047 APLITE OR LEUCOGRANITE. Hand specimen. Pale pink, massive, pervasively fractured at 1–5 mm scale, nonmagnetic, hypabyssal intrusive rock consisting of aphanitic (maximum 0.1 mm), visually undifferentiable quartz and feldspar (SEM = 40% quartz, 60% K-spar) with no mafic minerals. Fractures are healed with hairline quartz veinlets that are mineralized with specular to mostly earthy red hematite occurring in paper-thin, 0.3–2 mm patches and locally display faint yellow U staining (radioactivity is only nominally above background).
- 10-PTA-R048 METAGREYWACKE. Hand specimen. Dark grey, strongly foliated, nonmagnetic, clastic metasediment consisting of 10% relict, partially recrystallized plagioclase or lithic grains and 3% quartz grains of medium to coarse sand size (0.3–1.5 mm) in a silt to very fine sand-sized (0.05–0.15 mm) matrix of recrystallized, sugary undifferentiable plagioclase and quartz with 30% biotite and 0.2% finely disseminated (0.1–0.3 mm) syngenetic or diagenetic pyrite.
- 10-PTA-R054 QUARTZ VEIN. Drill core. White, massive, crystalline quartz; extensively fractured, faintly shear-banded and locally brecciated and re-veined, Early fractures are hematite-stained and, where normal to the younger shear trend, have a sutured, stylolite-like appearance. Shear seams are up to 2 cm wide, infilled with buff-yellow, medium to coarse-grained (up to 1 mm), conformable, sericite/marcasite flakes which are crosscut by younger, colourless, inward-growing quartz crystals indicating dilational re-opening of the shears. Breccia pores are lined with similar quartz crystals and partially infilled with coarse (0.5–2 mm), platy crystals of specular hematite.
- 10-PTA-R056 METAGREYWACKE. Drill core. Pale to medium grey to variably brick red (hematite-stained), strongly foliated, nonmagnetic, clastic metasediment consisting of

5% relict, partially recrystallized, undifferentiable plagioclase/lithic grains and 5% quartz grains of medium to coarse sand size (0.3–1 mm) in a partially recrystallized matrix consisting of 50% plagioclase, 20% quartz, 30% biotite and 3% very fine to medium-grained (0.05–0.3 mm), disseminated, cubic, syngenetic or diagenetic pyrite. Greywacke is patchily stained orange-red in irregular, 1 cm wide, hematitic oxidation fronts.

- 10-PTA-R057 LAMPROPHYRE. Drill core. Medium grey-green, flow-foliated, nonmagnetic, sparsely xenolithic, varitextured, hypabyssal intrusive rock consisting of 10% platy, euhedral, moderately flow-aligned, 0.5–2 mm long biotite phenocrysts (SEM confirmed; no phlogopite; variably chloritized) and 20% anhedral, 0.2–0.4 mm plagioclase microphenocrysts variably disseminated to clustered (segregated) within a semi-aphanitic, darker, chlorite-rich (-1 0%) groundmass that also forms segregated patches up to 5 mm in diameter and contains 0 to 3% (average 1%) fine-grained (0.05–0.3 mm), disseminated pyrite. Also present is a single, rounded, 5 cm xenolith of pink leucogranite identical to the matrix phase of Sample 060 (i.e. graphic-textured quartz and alkali feldspar with negligible biotite) and two sets of 0.3–2 mm wide veinlets: (a) early calcite veinlets that constitute «1% of sample but contain 20% deep purple fluorite grains up to 0.5 mm in diameter; and (b) later, cross-cutting quartz-dolomite veinlets that constitute 2% of sample and contain 5% coarse-grained (0.3–0.5 mm) cubic pyrite.
- 10-PTA-R060 PORPHYRITIC LEUCOGRANITE. Drill core. Pale pink, massive, distinctly porphyritic, very weakly magnetic, probably subvolcanic intrusive rock consisting of 3% large, 3–8 mm, rounded, smokey grey quartz phenocrysts and 1% each of smaller, 2–3 mm, white perthitic (string-type) alkali feldspar and biotite phenocrysts in a medium-grained, 0.5 mm groundmass consisting of 35% quartz, 60% alkali feldspar (perthitic and often graphically intergrown with quartz), 3% biotite (variably chloritized) and 0.1% finely disseminated magnetite.
- 10-PTA-R062 METAGREYWACKE. Drill core. Dark grey, strongly foliated to semi-schistose, nonmagnetic, elastic metasediment consisting of 5% relict, partially recrystallized, undifferentiable plagioclase/lithic grains and 5% quartz grains of medium to coarse sand size (0.3–1 mm) in a partially recrystallized, variably sugary matrix of 50% plagioclase and 20% quartz (differentiable from plagioclase only where least recrystallized) grains of fine sand size (0.1–0.2 mm) with 30% biotite flakes and 2% fine-grained (0.05–0.2 mm), disseminated, cubic, syngenetic or diagenetic pyrite.
- 10-PTA-R065 DIABASE. Hand specimen. Dark grey-green, massive, strongly magnetic, unmetamorphosed, hypabyssal intrusive rock consisting of 50% coarse-grained (1.5–3 mm long), fresh (not saussuritized), prominently albite-twinned plagioclase laths

ophitically enclosing 25% subhedral, 1–1.5 mm crystals of dark grey-brown clinopyroxene (SEM augite) and 25% anhedral grains of yellow-brown, partially serpentinized, fayalitic olivine containing 25% magnetite (5% of overall sample) as smaller, 0.15–0.4 mm grains plus rare traces of finer grained (0.1 mm) pyrite.

- 10-PTA-R072A DIORITE WITH VOLCANOSEDIMENTARY XENOLITHS. Hand specimen. 70% of sample consists of diorite, 15% is a 5 cm metabasalt xenolith and 15% is a 5 cm quartzite xenolith. Diorite is a speckled dark green and black, nonmagnetic, weakly foliated plutonic rock consisting of 60% plagioclase as 2–5 mm, subhedral, cloudy white (saussuritized) to locally white-twinning plagioclase crystals, 35% interstitial hornblende (variably biotite), 5% quartz and 0.05% pyrite, mainly along contact with quartzite xenolith. Basalt is black and consists subequally of fine-grained (0.1–0.2 mm) hornblende and plagioclase with 5% almandine as 1–2 mm metacrysts (diorite also contains a few scattered almandine xenocrysts). Quartzite is white and consists entirely of sorted, recrystallized quartz grains of medium sand size (0.3–0.5 mm).
- 10-PTA-R072B DIORITE. Hand specimen. Identical to intrusive phase of No. R072A.
- 10-PTA-R073 SILICATE-SULPHIDE FACIES IRON FORMATION. Hand specimen. Rusty brown-weathered, bedded at mm to cm scale, fractured, nonmagnetic to locally very weakly magnetic metasedimentary rock consisting of 75% brown, acicular, medium-grained (0.3–0.5 mm) grunerite (SEM confirmed; variably black hornblende), 10% coarser, 2–5 mm almandine metacrysts concentrated in a single, 1 cm thick band with 2% coarse-grained biotite, and 15% recrystallized, fine to medium-grained (0.1–0.5 mm) pyrite (no pyrrhotite; faint magnetism appears to be due to local trace magnetite), mostly disseminated in grunerite with concentration increasing near fracture intersections, locally in 1–2 mm thick bedding laminae.
- 10-PTA-R138 LAMPROPHYRE OR SYENITE. Drill core. Brick red, green spotted, porphyritic hypabyssal intrusive rock consisting of 5% chlorite phenocrysts of 1–5 mm size and rare (one observed) 1 cm autoliths in a fine-grained (0.2–0.3 mm), flow-foliated, quartz-free groundmass consisting of 85% alkali feldspar (SEM anorthoclase on perthite), 5% variably chloritized biotite (SEM confirmed; no phlogopite), 10% tremolite (SEM confirmed), 2% coarsely disseminated (0.5–2 mm) to fracture-hosted pyrite and 1% fracture-hosted calcite. Observed autolith is slightly coarser grained (0.3–0.5 mm) and more mafic (40% biotite/chlorite).