RESULTS

TABLE 1. PETROGRAPHIC/MINERAGRAPHIC SUMMARY

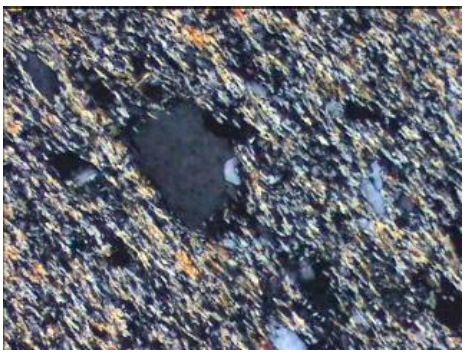
Sample	Comment	Lithology and Replacement	Deposition
26023.01 OPRC76E 194.2 m	Carbonate inclusions in quartz indicate that early carbonate may have been part of the vein assemblage. Gold, base metal sulphide and bismuth minerals have been locally remobilised and reconstituted within the vein assemblage. Secondary fluid inclusions present relate to the deformation event and "ore" minerals.	Silty mudstone 1.(met) quartz, muscovite, biotite, alkali feldspar, chlorite, pyrite, rutile, arsenopyrite, tourmaline, electrum	1.(vein) quartz, muscovite, biotite (→ chlorite), chlorite, apatite, carbonate, gold/electrum, sphalerite, galena, chalcopyrite, ?bismuth minerals, arsenopyrite, pyrite, pyrrhotite
26023.02 OPRC76E 222.1 m	Biotite + carbonate may represent metamorphism of an early sericite + chlorite + carbonate hydrothermal replacement assemblage. Local abundance of sulphide-bearing CO_2-rich inclusions may represent dissolution of carbonate and sulphide minerals.	Silty sandstone 1.(met) quartz, alkali feldspar, carbonate, muscovite, biotite, chlorite, pyrite, arsenopyrite, pyrrhotite, rutile 2.sericite, chlorite	1.(vein/veinlet) quartz, biotite, muscovite, tourmaline, apatite; biotite, quartz, carbonate, pyrite, arsenopyrite, gold/electrum, pyrrhotite
26023.03 OPRC76E 250 m	Metamorphism of wallrock together with two stages of veining: 1 of quartz + carbonate and a later stage of exclusive carbonate. Fluids, represented by pseudosecondary CO_2 bearing inclusions, associated with the metamorphic overprint have precipitated secondary carbonate together with sulphide minerals.	Biotite/amphibole quartz diorite 1.(met) muscovite, biotite, pyrite, pyrrhotite, alkali feldspar, carbonate, quartz 2.chlorite	1.(vein) quartz; quartz, carbonate, biotite (→ chlorite), pyrrhotite, pyrite, chalcopyrite, rutile, galena, ilmenite, ?bismuth minerals, gold/ electrum, sphalerite, apatite, tourmaline, 2.(vein) carbonate, galena, sphalerite, pyrrhotite, pyrite, chalcopyrite
26023.04 OPRC76E 240 m	Quartz, intergrown with equally coarse grained biotite and carbonate is secondary after an early vein assemblage. Fluid inclusions in the quartz can only be related to the metamorphic event. The texture may be interpreted in terms of complete recrystallisation followed by deformation at elevated temperatures.	Quartz monzonite/porphyry 1.(met) quartz, alkali feldspar, muscovite, biotite, carbonate, rutile, pyrrhotite, chalcopyrite, apatite, chlorite 2.chlorite	1.(vein/veinlet) quartz, biotite, carbonate, pyrrhotite, chalcopyrite, rutile; carbonate
26023.05 OPRC76E 282.4 m	The metamorphic replacement assemblage appears not to represent any significant strain fabric. The equilibrium metamorphic replacement assemblage comprises biotite, chlorite, muscovite, alkali feldspar and carbonate. Chalcopyrite and pyrrhotite are part of the replacement assemblage.	Amphibole quartz diorite 1.(met) muscovite, carbonate, biotite, alkali feldspar, chlorite, sphene, rutile, ilmenite, pyrrhotite, apatite, pyrite 2.chlorite	1.(veinlet) carbonate, biotite

26023.06 OPRC76E 300	Interstitial pyrrhotite, carbonate, quartz, biotite and base metal sulphides were precipitated from a late CO_2-rich and sulphurous aqueous fluid. The quartz and carbonate vein assemblage represent metamorphism of a precursor quartz + carbonate + sulphide assemblage. Sulphide veinlets link with CO2 fluid inclusion trails.	Silty mudstone 1.(met) muscovite, pyrrhotite, rutile, biotite, quartz, chlorite, sphalerite, chalcopyrite, carbonate 2.chlorite	1.(vein) quartz, carbonate, biotite (→ chlorite), pyrrhotite; quartz, carbonate, biotite, sphalerite, galena, arsenopyrite, pyrrhotite 2.(veinlet) biotite, chlorite, pyrite; carbonate
26023.07 OPRB484 48-57	A metamorphosed quartz and feldspar rich fine sandstone. The metamorphic replacement assemblage is equigranular in texture with no real strain fabric apparent and comprises garnet, biotite and ghosted Al-silicate minerals indicative of low-P/mod-T type metamorphism.	Feldspathic quartz fine sandstone 1.(met) quartz, alkali feldspar, muscovite, biotite, garnet, rutile, pyrite, Al-silicate 2.sericite/illite 3.hematite, hydrated Fe-oxides	1.(veinlet) hematite, hydrated Fe-oxides
26023.08 OPRC74 171 m	Electrum is associated with an arsenopyrite porphyroblast integral to the metamorphic replacement assemblage marginal to a discrete quartz veinlet. Late fluid movement is represented by pyrrhotite veinlets and inclusion trails in quartz of the vein assemblage and metamorphic replacement assemblages.	Silty sandstone 1.quartz, muscovite, biotite, tourmaline, carbonate, pyrrhotite, pyrite, arsenopyrite, galena, sphalerite, chalcopyrite, electrum 2.chlorite	1.(veinlet) quartz, alkali feldspar, carbonate, arsenopyrite, galena 2.(veinlet) carbonate 3.(veinlet) pyrrhotite
26023.09 OPRB482 69-78m	Whereas there is a strong strain fabric in the metamorphosed silty mudstone, there is no strain fabric in the igneous rock. The good degree of crystallinity of biotite and amphibole indicates a relatively high grade of metamorphism. The coarse grained decussate replacement texture and absence of a strain fabric is indicative of thermal metamorphism.	Quartz diorite and silty mudstone 1a.(met) alkali feldspar, biotite (→ chlorite), hornblende, epidote, carbonate, quartz, pyrrhotite, arsenopyrite 1b.(met) quartz, muscovite, biotite, arsenopyrite 2.chlorite	1.(veinlet) carbonate, chlorite
26023.10 OPRC73/ 144-147 m	Fragmentation of the metamorphosed rock is cemented with biotite (→ chlorite) and carbonate. Fragmentation has post-dated peak metamorphism. Early quartz + carbonate veining has been metamorphosed together with the wallrock. A finer grained version of other diorites present, but with little groundmass quartz.	Quartz diorite porphyry 1.alkali feldspar, muscovite, carbonate, rutile, arsenopyrite, galena; muscovite/sericite 2.hematite	1.(veinlet) quartz, alkali feldspar; carbonate, muscovite 2.(veinlet/cement) biotite (→ chlorite), carbonate, pyrrhotite, quartz, pyrite 3.(veinlet) carbonate, pyrrhotite
26023.11 OPRB571 72-78 m	A metamorphosed biotite quartz diorite. Metamorphism is represented by intergrowths of muscovite, biotite, alkali feldspar and epidote that may be differentiated from early deuteric alteration of such a rock. The rock is similar in composition and texture to the hornblende quartz diorite (26023.09).	Biotite quartz diorite 1.Alkali feldspar, muscovite, epidote, biotite, quartz, cordierite, pyrite, pyrrhotite 2. sericite, chlorite 3.hematite, kaolin, smectite clays	1.(veinlet) hematite, hydrated Fe-oxides

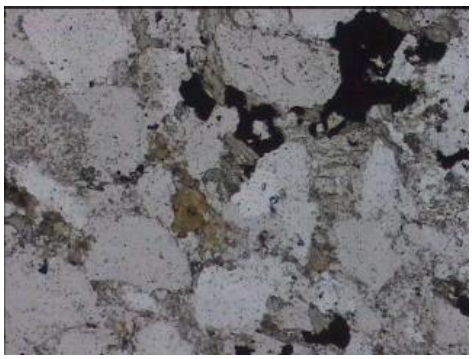
26023.12 OPRB589 46-48 m	Spherical cavities filled with granoblastic quartz may represent vesicles. Strong weathering is a result of the susceptibility of the predominantly mafic metamorphic replacement assemblage to oxidation. The distribution of quartz, hematite and kaolin clays represent liesegang banding as seen in hand-specimen.	Fine grained mafic igneous rock 1.quartz, muscovite, biotite, actinolite/tremolite, pyrite, pyrrhotite 2.kaolin/smectite clays, hematite, hydrated Fe-oxides, quartz	1.(cavity) quartz 2.(veinlet) hematite, hydrated Fe-oxides
26023.13 OPRB589 58-60m	Granoblastic quartz after primary interstitial quartz and relict and ghosted muscovite and biotite after feldspar represent metamorphism. The hematite-rich drill chips enclosing quartz fragments may represent late-stage shear-zones along which oxygenated supergene fluids have migrated.	Biotite quartz diorite 1.quartz, biotite, arsenopyrite, muscovite 2.hematite, hydrated Fe-oxides, kaolin clays, quartz, carbonate	1.(veinlet/cavity) hematite, hydrated Fe-oxides
26023.14 OPRB603 57-60 m	Most quartz veining present has been deformed and metamorphosed together with the wallrock lithology. Present are some examples of mesothermal style quartz veining, which has not been metamorphosed. Some of the carbonate and sericite alteration appears to be part of the post metamorphic hydrothermal alteration.	Siltstone and mudstone 1.quartz, muscovite, alkali feldspar, biotite, rutile, pyrite, carbonate 2.hematite	1.(veinlet) quartz 2.(veinlet) quartz, pyrite; sericite
26023.15 OPRB505 33-42 m	Metamorphism is notable for a lack of a significant strain fabric, and locally equigranular textures. The peak metamorphic replacement is strongly weathered, with secondary (and any primary) alkali feldspar altered to kaolin clays and biotite altered to hematite, hydrated Fe-oxides and kaolin clays.	Quartz rich/poor siltstone 1.(met) quartz, alkali feldspar, muscovite, biotite 2.sericite, chlorite 3.hematite, hydrated Fe-oxides, kaolin clays	1.(veinlet) quartz, alkali feldspar 2.(veinlet) hematite, hydrated Fe-oxides

ROCK TYPES

Metasedimentary Rocks



Left. 26023.01. Strain fabric defined by preferred orientation of fine grained muscovite. 600µm. cpl. Right. 26023.02. Biotite together with muscovite, chlorite, pyrite, pyrrhotite, and arsenopyrite, interstitial to recrystallised detrital quartz. 1200 µm. ppl.



Metamorphosed sedimentary rocks from OPRC076E (Table 1) comprise metamorphosed silty mudstones and silty sandstones. Peak metamorphic replacement mineralogy comprises one or

RESULTS: OLD PIRATE

ROCK TYPES

TABLE 1. PETROLOGICAL SUMMARY: OLD PIRATE DIAMOND HOLE SAMPLES (THIS STUDY)

Sample	Comment	Lithology and Replacement	Deposition
26011.01 OPD001/ 119.5 m	The wallrock and quartz vein assemblage has been deformed together at elevated temperatures. A retrograde metamorphism is represented by pervasive sericite/illite.	Quartz feldspathic arenite -(met) quartz, muscovite, ?feldspar, biotite, rutile -sericite/illite -kaolin clays, hematite	-(vein) quartz, opaques, feldspar (→ sericite/illite), biotite (→ sericite/illite, chlorite) -(cavity) hematite)
26011.02 OPD002/ 151.6 m	Gold is present as relict grains within pseudomorphed Fe-sulphides (morphologies indicative of pyrite and arsenopyrite), and is remobilised into micro-fractures filled with ultra fine-grained hematite and hydrated Fe-oxides.	Silty mudstone -(met) muscovite, biotite, tourmaline, graphite, rutile, opaques -sericite/illite -hematite	-(veinlet) muscovite) -(vein/cement) quartz, feldspar (→ sericite/illite), muscovite, tourmaline, biotite (→ sericite/illite, hematite, Fe-sulphides (→ hematite), pyrite, pyrrhotite, chalcopyrite, native gold; hematite -(veinlet) hematite, hydrated Fe-oxides, native gold
26011.03 OPD002/ 143.3 m	Gold occurs as inclusions within and along "primary" framework quartz grain boundaries. Recrystallisation of quartz is coincidental with the occurrence of native gold. The gold has a close spatial association with gas-rich/filled and coexisting aqueous liquid-rich inclusions.	No wallrock material present with vein assemblage in polished section	(vein) quartz, pyrite, chalcopyrite, pyrrhotite, ?galena/BiTeS minerals, native gold; muscovite -(veinlet/cavity) hematite, hydrated Fe-oxides

Metamorphosed sedimentary rocks are host to mineralisation in the Old Pirate project area. The grade of metamorphism varies within the greater prospect area such that primary sedimentary textures are better preserved in some areas relative to others. The sedimentary rocks are interpreted to have comprised lithic quartz and quartz lithic feldspathic arenites and related siltstones, silty mudstones and mudstones. Detrital muscovite, tourmaline, rutile and zircon are present.

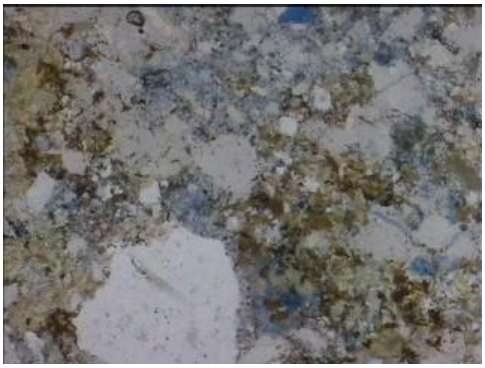


Plate left. Biotite after matrix, intergrown with possible ghosted Al-silicate minerals. 1200 μm. ppl
Plate right. Meta-mudstone with lamination partly defined by the distribution of metamorphic biotite. 1200 μm, ppl