*Pontifex & Associates Pty Ltd*

**MINERALOGY – PETROLOGY · SECTION PREPARATION**

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# MINERALOGICAL REPORT No. 8923

***by Alan C. Purvis, PhD***

September 14th, 06

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| **TO :** | Mr David 'Rowdy' Rawlings<br>Cameco Australia Pty Ltd<br>PO Box 35921<br>WINNELLIE NT 0820 |
| **YOUR REFERENCE :** | Order No. 04909 |
| **MATERIAL & IDENTIFICATION :** | 35 rock/core samples various Cameco projects |
| **WORK REQUESTED :** | Thin section preparation, description and report with comments as specified. |
| **SAMPLES & SECTIONS :** | Returned to you with this report. |
| **DIGITAL COPY :** | Enclosed with hard copy of this report. |

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**GR060019** **Coarse to very coarse-grained sandstone with interstitial chalcedony and vein-like arrays rich in fine-grained hematite.**

**Field Note:** *Hematised and silicified fine sandstone breccia with weakly elevated cps*

**PETROGRAPHY:**

A visual estimate of the modal mineral abundances:

| Mineral | Abundance | Origin/location |
|---|---|---|
| Quartz | Dominant | Detrital |
| Chalcedony and microsparry quartz | Common | Interstitial |
| Hematite | Very minor | In fractures and interstitial |

This sample does not seem to be a breccia as suggested in your notes but is quartz-rich coarse to very coarse-grained sandstone that is very rich in interstitial material. Abundant rounded and irregular single-crystal quartz grains are mostly less than 1mm in diameter but there are some larger grains and sparse polycrystalline quartz grains are also disseminated. The interstitial material is largely composed of chalcedony, partly as bands passing into microcrystalline quartz and partly as larger spherulites. Minor microcrystalline hematite is present in vein-like arrays, mostly within interstitial areas but also in fractures in quartz grains. There are also fractures without hematite, locally with narrow quartz infills, with slight offsets, mostly 0.5-0.7mm, across some of these fractures. Most of the chalcedony is length-fast but there is minor length-slow chalcedony or fibrous quartz as well as microcrystalline quartz. The chalcedony suggests different fluid compositions to those responsible for optically continuous overgrowths or fine columnar quartz overgrowths.

**GR060025** **Extremely altered possible basalt with sparse feldspar phenocrysts and amygdales as well as microlites and areas of perlitic cracking: sericite/illite-limonite/hematite-leucoxene alteration is intense with rare prehnite and quartz-clay veins.**

**Field Note:** *Altered yellow basalt*

**PETROGRAPHY:**

A visual estimate of the modal mineral abundances:

| Mineral | Abundance | Origin/location |
|---|---|---|
| Sericite/illite-I | Minor | Ex-feldspar phenocrysts |
| Sericite/illite-II | Major | Ex-groundmass |
| Yellow limonite staining ± leucoxene | Common | Pervasive flooding |
| Orange limonite | Minor | Flooding and in fractures |
| Dark limonite/hematite | Minor | Mostly in fractures |
| Prehnite | Rare | Patches in illite |
| Green clay and sericite/illite | Very minor | In possible amygdales |
| Quartz and sericite/illite | Minor | In veins |

About $^{2}/_{3}$ of this thin section has clear sericite or illite representing small probable plagioclase phenocrysts about 1mm long, partly in small aggregates. The groundmass has been altered to weakly or highly clouded sericite/illite with pale yellow staining from limonite and white leucoxene staining. Parts of the groundmass are massive and structureless but others have abundant perlitic cracking in complex arrays with limonite or hematite in the fractures. These are most abundant in areas that lack obvious altered feldspar phenocrysts, usually with limonite/hematite-altered microlites and rare sericite or green clay-filled possible amygdales. A few areas contain microspherulitic prehnite and there are also lenticular veins filled with microcrystalline quartz and sericite/illite. This may represent former basalt but some geochemistry may be useful (e.g. Ti/Zr ratio).

**GR064008** **Medium to very coarse-grained sandstone with a lens of fine to medium-grained sandstone, probable optically continuous overgrowths commonly cut by sericite or illite with limonite and sparse anatase. Some interstitial quartz may be hydrothermal.**

**Field Note:** *Sandstone with hydrothermal quartz crystals similar to 'South Horn'?*

**PETROGRAPHY:**

A visual estimate of the modal mineral abundances:

| Mineral | Abundance | Origin/location |
|---|---|---|
| Quartz | Dominant | Mostly detrital |
| Yellow sericite/illite | Minor | Interstitial |
| Limonite | Very minor | With sericite/illite |
| Anatase | Very minor | Detrital or authigenic? |

Most of this sample has single-crystal quartz grains with maximum grainsizes varying from 0.5mm to 1.5mm across the thin section (medium to very coarse-grained sandstone), although there is also a lens to 4mm wide with most of the quartz between 0.1mm and 0.4mm in grainsize (fine to medium-grained sandstone). The quartz mostly has planar grain boundaries suggesting optically continuous overgrowths, although detrital cores are not defined. Also there are abundant patches and small flakes of yellowish sericite or illite that partly lie along quartz grain boundaries but are more commonly crosscutting, probably into optically continuous overgrowth zones in the quartz. Some areas also have interstitial fine-grained quartz that seems to be partly euhedral and may represent the hydrothermal quartz referred to in your notes. The clay has small patches of limonite and there are disseminated aggregates of fine-grained anatase.