Pontifex & Associates Pty Ltd

MINERALOGY - PETROLOGY · SECTION PREPARATION

A.B.N. 25 007 521 084

26 Kensington Rd, Rose Park South Australia 5067 Tel: +61 8 8332 6744 Fax: +61 8 8332 5062 PO Box 91 Kent Town SA 5071 AUSTRALIA

Email: ian@pontifexpetrographics.com.au Website: www.pontifexpetrographics.com.au

MINERALOGICAL REPORT No. 10206 by Alan C. Purvis, PhD

October 28th, 2012

TO :	Richard DuRieu Exploration Manager UXA Resources 43a Fullarton Road KENT TOWN SA 5067	
YOUR REFERENCE :	Memo from Richard Du Rieu 29/8/12	
MATERIAL :	Pandanus West Rock Samples	
IDENTIFICATION :	155281 to 155289	
WORK REQUESTED :	Polished thin section preparation, description and report.	
SAMPLES & SECTIONS :	Returned to you with this report.	
DIGITAL COPY :	Emailed (date) to: spowell@uxa.com.au rdurieu@uxa.com.au	

PONTIFEX & ASSOCIATES PTY. LTD.

SUMMARY COMMENTS

This report describes six polished thin sections numbered 155281, 283, 284 and 287-289 from UXA's Pandanus West project, Westmoreland area, NT, Westmoreland Conglomerate and Seigal Volcanics

The petrology indicates sandstones (similar to those in the Kombolgie Subgroup in the Northern Territory) an altered basalt (Seigal Volcanics), as well as a silty claystone, and a ferricreted possibly superficial quartz sand. These are summarised by listing the headers below from the individual descriptions (which are integrated with photomicrographs).

155281: Basalt, altered to limonitic hematitic clays. Has a chilled amygdaloidal zone with interconnecting amygdales, and a less chilled zone with isolated amygdales, separated by a quartz-rich possible pipe vesicle. Minor possible kspar. (Possibly represents Nungbalgarri or Gilruth Volcanics o the Kombolgie Sub group, if it is from the same area as previous Pontifex Report 9985, September 2011.

The following three samples of sandstones have optically continuous overgrowths on the rockforming sand grains and stylolitic grain boundaries but only minor sericite clays \pm limonite/hematite and may be regarded as aquicludes in the model of Polito et al., 2011. The presence of quartz veins in sample 155289 suggests that fractures have allowed passage to hydrothermal fluids in some areas. The sandstones are:

155283: Poorly sorted coarse to very coarse-grained sandstone with single crystal and polycrystalline quartz grains (\pm limonite), mostly with optically continuous overgrowths. Also stylolitic grain boundaries and patches of interstitial illite and limonite.

155287: Fine to medium-grained sandstone with limonite-stained single crystal quartz grains with poorly defined optically continuous overgrowths in some areas as well as stylolitic grain boundaries and minor interstitial limonite-stained illite or kaolinite with minor porosity.

1552889: Coarse to very coarse-grained sandstone with single crystal and polycrystalline quartz grains commonly with optically continuous overgrowths. Locally with interstitial limonite-stained quartz or illite and locally porous. Quartz-rich veins occur locally and there is an open fracture and a limonite-filled fracture.

The other two samples in this batch are:

Sample 152284 Laminated and foliated silty claystone, with rare fine sand and lenses of limonite, partly along silty lenses:

Sample 155288 Ferricreted (limonite/goethite-flooded) sand or sandstone with irregular voids.

Reference: PA Polito et al. Advances in understanding the Kombolgie Subgroup and unconformity – rotated uranium deposits in the Alligator Rivers Uranium Field and how to explore for them using lithogeochemical principles. AJ Earth Sciences 58:5, 453-474

INDIVIDUAL PETROGRAPHIC DESCRIPTIONS

155281	Limonite/hematite-flooded partly clay-quartz-altered basalt with
	a more chilled amygdaloidal zone with interconnecting amygdales
	and a less chilled zone with isolated amygdales, separated by a
	quartz-rich possible pipe vesicle. May contain K-spar.

Field Note: Calvert South – vesicular basalt with green clay vesicles: 791863E, 8050745N

Hand Specimen

This sample is reddish brown including a central quartz-rich zone.

Thin Section

This sample is divided into two by a central quartz-rich zone from 3-6mm wide with irregular margins, especially along one side where the adjacent wall rock is largely limonite-flooded with abundant interconnected probable amygdales with zoned infills. Most if these amygdales have a narrow rim of fine quartz separated from a further infill of quartz by narrow zone of limonite \pm hematite. A few small amygdales contain pale green chlorite \pm yellow-brown clay. The host rock is partly fragmental, mostly fine-grained with possible albite and/or clays but is clouded by limonite \pm hematite and difficult to identify in thin section.

The central quartz-rich zone also has a narrow rim of fine-grained quartz separated from finegrained and sparry quartz by a narrow zone of limonite. Small lenses of very fine-grained quartz, are rimmed by limonite. Zones of sparry quartz close to the above area have finer quartz on the other side. Small protrusions into the central vein have are nucleation points for radiating quartz aggregates.

The opposite side of the quartz-rich zone has sparse mostly clay-altered feldspar shapes to 0.8mm long and abundant quartz-clay aggregates to 0.8mm long apparently replacing mafic grains, possibly pyroxene, also red hematite/limonite clouding. Small amygdales in this zone are isolated from each other up to 2.5mm long, some filled by single crystal quartz grains with clay rims, and others with khaki clay, possibly chlorite \pm smectite or corrensite, \pm quartz.

Interpretation:

This sample is mostly altered basalt with limonite \pm hematite-clouded areas with the central quartz-rich zone possibly representing a pipe vesicle, or a fracture close to the flow-top (if this is extrusive). Amygdaloidal aphanitic basalt with interconnecting amygdales occur on one side of this zone. The other side has more crystalline basalt with feldspar and relict feldspar shapes and isolated amygdales more commonly filled by clay that those on the other side. The assay value of 5.4% K suggests possible K-spar as well as clay in this sample.

The basalt could represent the Nungbalgarri or Gilruth volcanic members of the Kombolgie Subgroup, (if it is from the same general area as those described in previous report 9985).



155281

500 µm

Thin section (TS). Plane polarised light (PPL). Magnification (x20). Example of the area with more and larger vesicles in this thin section with quartz-filled amygdales and veins and clouded altered basalt.



 Fig 2
 155281
 500 μm

 TS. PPL. Clay-limonite-altered in another area of less amygdaloidal basalt with clay in amygdales and quartz in fractures.
 500 μm

155283	Poorly so	rted coarse to	very coarse-gra	ined san	dstone with	single
	crystal an	d polycrystal	line quartz grain	s (± limo	onite), most	ly with
	optically	continuous	overgrowths.	Also	stylolitic	grain
	boundarie	es and patches	s of interstitial ill	ite and li	imonite.	

Field Note: Calvert South – high uranium occurrence in hard silicified sandstone: 792112E, 8050390N: 85ppm U

Hand Specimen

This sample is a small piece of pinkish sandstone.

Thin Section

Subrounded to subangular, mostly single crystal quartz grains from 0.2mm to 1.5mm in diameter dominate this sample with sparse polycrystalline limonite-stained clasts possibly representing altered acid volcanics, with sparse polycrystalline chert and vein or metamorphic quartz grains.

Most of the single crystal quartz grains are at least partly rimmed by optically continuous overgrowths with limonite rimming the detrital cores. Some grain contacts lack optically continuous overgrowths, suggesting stylolitic grain boundaries. A few interstitial patches, to 0.8mm long, contain interstitial illite and possible hematite or limonite but these make up less than 1% of the thin section.

Interpretation:

This sample represents coarse to very coarse-grained sandstone with single crystal and polycrystalline quartz grains commonly with optically continuous overgrowths but locally with stylolitic grain boundaries or interstitial illite \pm limonite/hematite.



155283

TS. PPL. (x50). Quartz-rich sandstone, some with thin and somewhat discontinuous overgrowth rims. Local interstitial dark hematite-illite.



Fig 4

155283

100 µm

TS. Crossed nicols (Xnic). (x100). Detail of the sandstone in Fig 3, with local optically continuous overgrowths and interstitial intergranular hematite-illite.

155284	Laminated and foliated silty claystone with rare fine sand and
	lenses of limonite, partly along silty lenses

Field Note: : White bleached chert of shale: 779383E, 8031939N

Hand Specimen

This sample is cream-coloured, fine-grained and apparently laminated and possibly foliated.

Thin Section

Foliated clay dominates this sample (apparently kaolinite because it sticks to the tongue). Mostly silt-sized angular quartz grains are scattered throughout the clay, somewhat sparsely, with similar grains in parallel lenses to 0.5mm wide. Rare rounded quartz grains are as much as 0.2mm in diameter (fine sand). Some of the silty lenses are stained by limonite and irregular patches of limonite are scattered.

Interpretation:

Classified as silty claystone with abundant probably kaolinitic clay. Lenses of silt and rare sand are incorporated within the clay.



 Figs 5 & 6
 155284
 200 μm

 TS. Fig 5: PPL. Fig 6: Xnic. (x50). Weakly foliated claystone with partly limonite-flooded microporous silty lenses. (Dark subrounded spots are air bubbles.)

155287	Fine to medium-grained sandstone with limonite-stained single
	crystal quartz grains with poorly defined optically continuous
	overgrowths in some areas. Also stylolitic grain boundaries and
	minor interstitial limonite-stained illite or kaolinite with minor
	porosity.

Field Note:Mod-well sorted medium-grained sandstone: 751430E 8029519N

Hand Specimen

This sample is pale pink sandstone similar to 155283.

Thin Section

Subangular single crystal quartz grains from 0.1mm to 0.5mm long dominate this thin section with rare detrital muscovite and trace green tourmaline (with colourless overgrowths). Many of he quartz grains are limonite-stained but limonite-rimmed cores and optically continuous overgrowths are rarely obvious and most of the limonite is irregular. Some adjacent quartz grains may have stylolitic grain boundaries, but there are scattered interstitial patches containing illite and/or probable kaolinite \pm limonite, with very minor porosity commonly rimmed by clay \pm limonite.

Narrow lenticular fractures and veins to 1mm wide are filled with microcrystalline quartz \pm limonite. The widest vein incorporates single crystal quartz grains from the adjacent sandstone, commonly rimmed by limonite, and has a lens of granular quartz to 0.25mm in grainsize. This vein and the adjacent sandstone have been cut by limonite-filled fractures.

Interpretation:

This sample represents fine to medium-grained sandstone with irregularly limonite-stained quartz. Interstitial patches are uncommon and contain kaolinite or illite \pm limonite, but optically continuous overgrowths are also rare and there may be abundant stylolitic grain boundaries. Lenses of vein-quartz are mostly microcrystalline with minor limonite and rare granular lenses.



 Fig 7
 155287
 200 μm

 TS. PPL. (x50). Sandstone with interstitial/intergranular limonite-stained clay. Local mostly south cherty band of vein with limonite-filled fractures.

155288 Limonite/goethite-flooded sand or sandstone with irregular vo
--

Field Note: Ferruginous sandstone, high Fe: 735930E, 8039105N

Hand Specimen

This seems to be a sample of laterite-flooded sandstone or ferricrete with minor porosity.

Thin Section

Mostly rounded single crystal and polycrystalline quartz grains to 2mm in diameter are abundant, with smaller partly angular grains from 0.1mm to 1mm in grainsize. The larger grains are commonly veined or fractured and fragmented and cemented by limonite. There is also abundant interstitial limonite \pm goethite \pm hematite (~60%) with irregular voids to 12mm long rarely containing patches of opal and/or limonite. Smaller voids in vein-like arrays are rimmed by colloform goethite, but there are also late hematite-filled fractures. Local veins contain angular quartz grains to 0.25mm in size in a porous limonite matrix. The sand grains its may be from superficial deposits rather than bedrock.



Figs 8 & 9155288200 μmFig 8: TS. PPL. Fig 9: PTS, RPL. (x50). Limonite-cemented sand with an open fracture containing limonite-
clouded opal. Bright pale grey and weakly zoned whole background in Fig 9 is goethite-limonite (black opaque in
Fig 8).



155288

TS. Xnic. (x100). Part crossed nicols highlights internal reflection within veins of fibrous goethite cutting limonite-cemented sand grain aggregate. This red microfractures may contain earthy hematite.

1552889	Coarse to very coarse-grained sandstone with single crystal and
	polycrystalline quartz grains commonly with optically continuous
	overgrowths. Locally with interstitial limonite-stained quartz or
	illite and locally porous: quartz-rich veins occur locally and there
	is an open fracture and a limonite-filled fracture.

Field Note: Silicified sandstone with pebble layers and abundant quartz veining: 734795E, 8047691N

Hand Specimen

This coarse-grained sandstone sample has subparallel quartz veins and is hematite-stained

Thin Section

Petrographically, the rock as confirmed as a sandstone with rounded to subangular single crystal and polycrystalline quartz grains mostly 0.5mm to 2mm in size (coarse to very coarse-grained sandstone). The polycrystalline grains are partly very fine-grained but also include possible metamorphic and/or vein-quartz, with rare limonite-stained very fine-grained clasts. Single crystal quartz grains commonly have deformation lamellae oblique to the trace of the basal plane. Most of the single crystal quartz grains have optically continuous overgrowths, with limonite or zones of fluid inclusions delineating the cores.

Interstitial microcrystalline quartz occurs locally and there are rare patches of illite, with minor limonite staining both quartz and illite. There is also minor porosity, possibly due to dissolution of whatever interstitial matter was formerly present.

Early quartz veins from 0.1mm to 1mm wide consist mostly of very fine-grained or fine-grained clouded quartz, locally with some quartz as optically continuous overgrowths on adjacent detrital quartz. These partly terminate against an irregular vein to 3mm wide, composed of mostly zoned granular to prismatic quartz. The quartz has zones rich and poor in fluid inclusions and is locally in optical continuity with adjacent detrital quartz. There is also an irregular open fracture 15-20mm long and locally more than 1mm wide, passing into a largely limonite-filled fracture.



155289

TS. Xnic. (x20) Sandstone with single crystal and polycrystalline quartz grains most with thin optically continuous overgrowths, several permeating veinlets of microcrystalline (cherty) quartz.

