MINERAL RESOURCES TASMANIA

Laboratory Report

LJN2021-030

XRD AND PETROLOGICAL ANALYSES

KIMBERLEY, TASMANIA

An unpublished Mineral Resources Report for:

M Latinovic
DPIPWE

By: R S Bottrill,
L Unwin
Date: 4th May, 2021

Mineral Resources Tasmania
Department of State Growth

Tasmanian Government

SUMMARY

The rock sample from Kimberley was found to be a fine grained, hematitic, glauconitic, dolomitic, siliceous sandstone which may be an Ordovician limey sandstone. Dolomitic quartz sandstones are unusual in these sequences but have been recorded from the Owen Group elsewhere in Tasmania.

INTRODUCTION

The objective of this study was to identify some small rock samples from a percussion water bore, collected by Miladin Latinovic, groundwater geologist of DPIPWE. They were thought to be possible pieces of Ordovician limestone by the original logger of the borehole. The sample details are given in Table 1.

Table 1: Sample details

Reg. #	Field No.	Location	Sample Description	Process
G410181	BH42379/39m+	Kimberley, Tas (GDA94 MGA55 : 457538E, 5416565N)	Reddish grey rock chips	TS, XRD

GEOLOGY

The Kimberley area has subdued outcrops of a unit described on the recent 25K MRT geology maps as Osm: Moina sandstone, of the Ordovician Owen group (Fig. 1). This borehole studied here is within this unit.

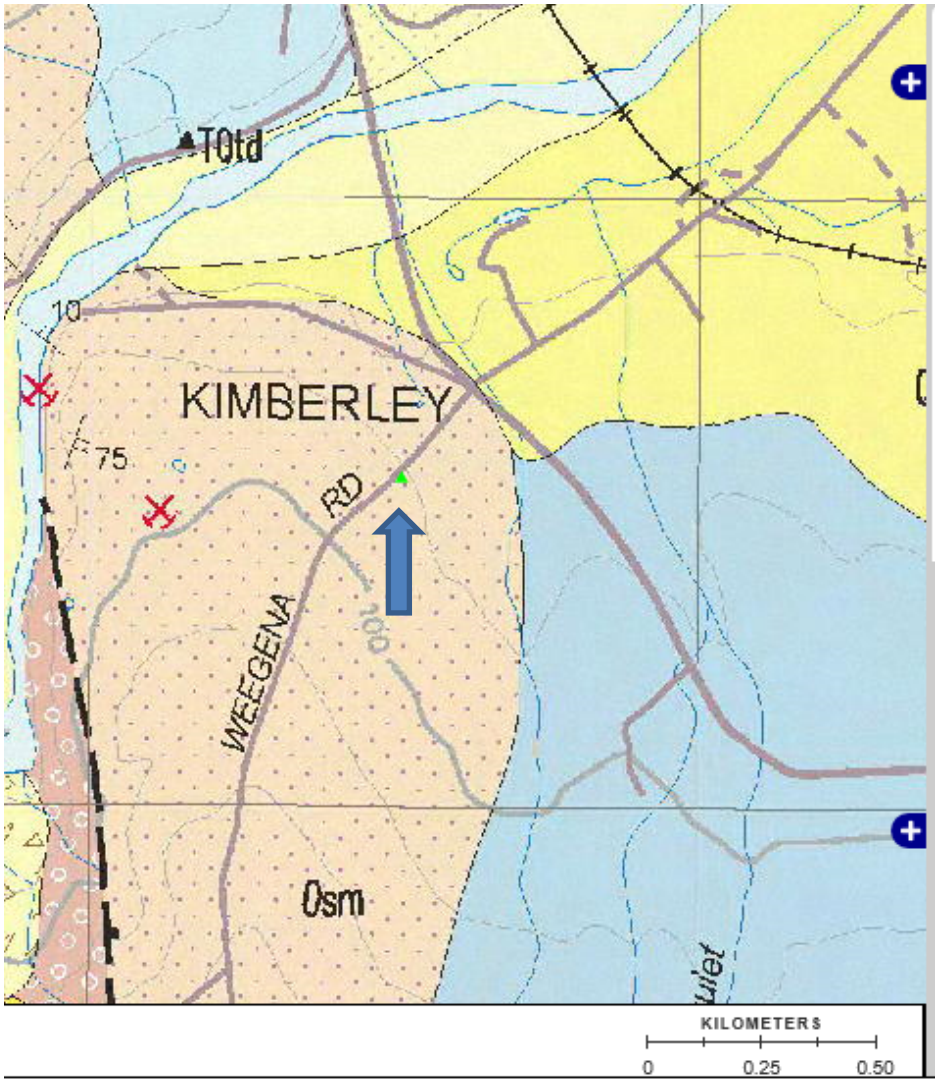

Figure 1. Section of the 25K geology map, from the online LIST maps provided by MRT. Blue arrow indicates the drillhole.

METHODOLOGY

The sample was subsampled for the grey rock chips, which were analysed for mineralogy by XRD (X-Ray Diffraction) in the Mineral Resources Tasmania (MRT) laboratories, Rosny, and reported here. Another subsample of some of these chips was prepared as a thin section at Utas and this was studied under polarised light microscopy to help determine the mineralogy.

DESCRIPTION & PETROGRAPHIC EXAMINATION

In hand specimen, the sample G410181 contains angular rock fragments to about 15mm across, and these comprise a fine grained, tough, massive, medium to dark reddish grey rock, with an irregular fracture and no obvious banding, veining or other inhomogeneities (Fig. 2).

Figure 2. G410181. Grey-brown gravel, as submitted. FOV ~50 mm.

In thin section (Figs. 3 - 5) it indicates:

- Quartz: ~50%, rounded to angular, 0.1 - 0.2mm
- Carbonate (dolomite?): angular to subrounded, ~35%, <0.3mm
- Glauconite: ~12%, highly rounded to angular, <1mm
- Mica (muscovite): ~1%, highly altered plates, <1mm
- Hematite?: ~1%, fine grained, mostly on grain boundaries, <10um
- Opaques (chromite?): <1%, rounded, <0.1mm

There is no obvious lamination, but some irregular zones of black to red hematite may be ferruginised laminae or fracture zones. The sand grains may have originally been well rounded but have been somewhat compacted and recrystallised.

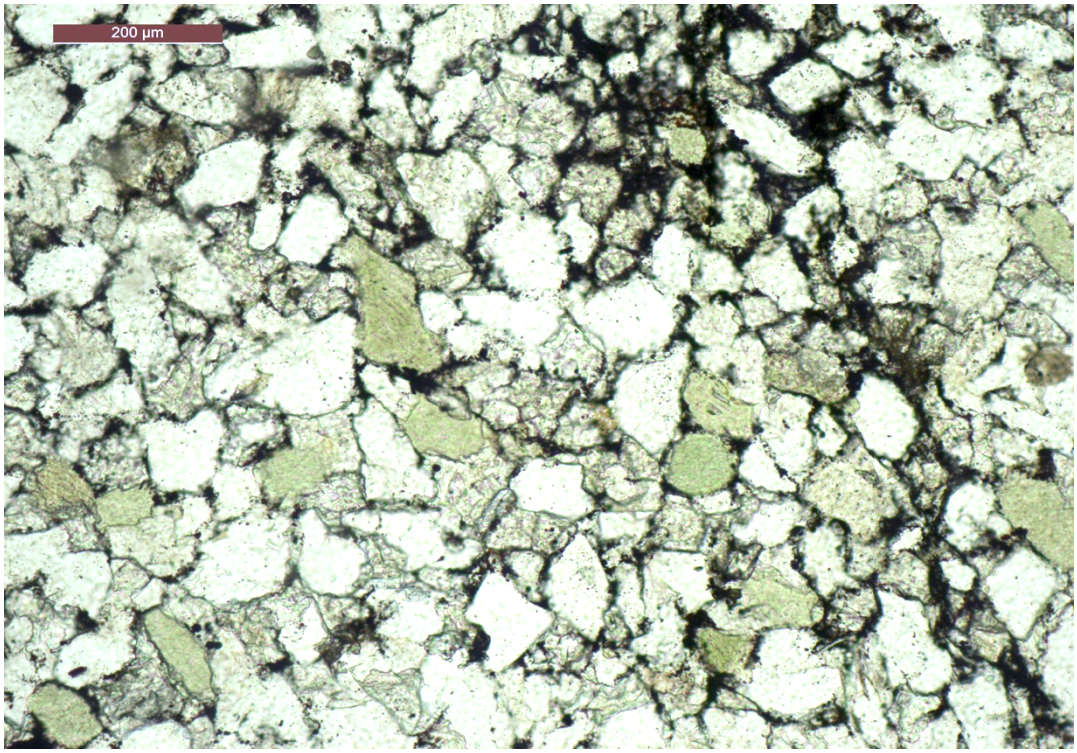

Figure 2. Sample G410181, showing a glauconitic, limey sandstone containing grains of green glauconite, white quartz and greyish (high relief) carbonates. Black material appears to be fine hematite. Plane polarised transmitted light (PPTL).

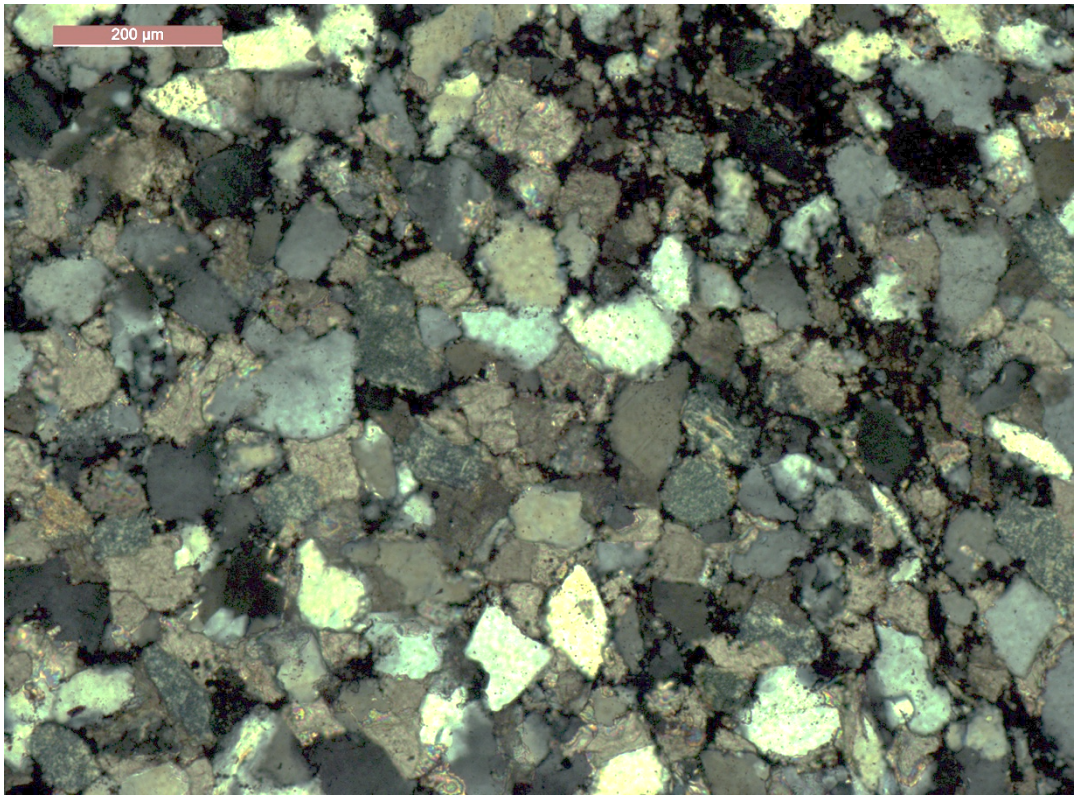

Figure 3. Sample G410181, showing the same area in Cross polarised transmitted light (XPTL).

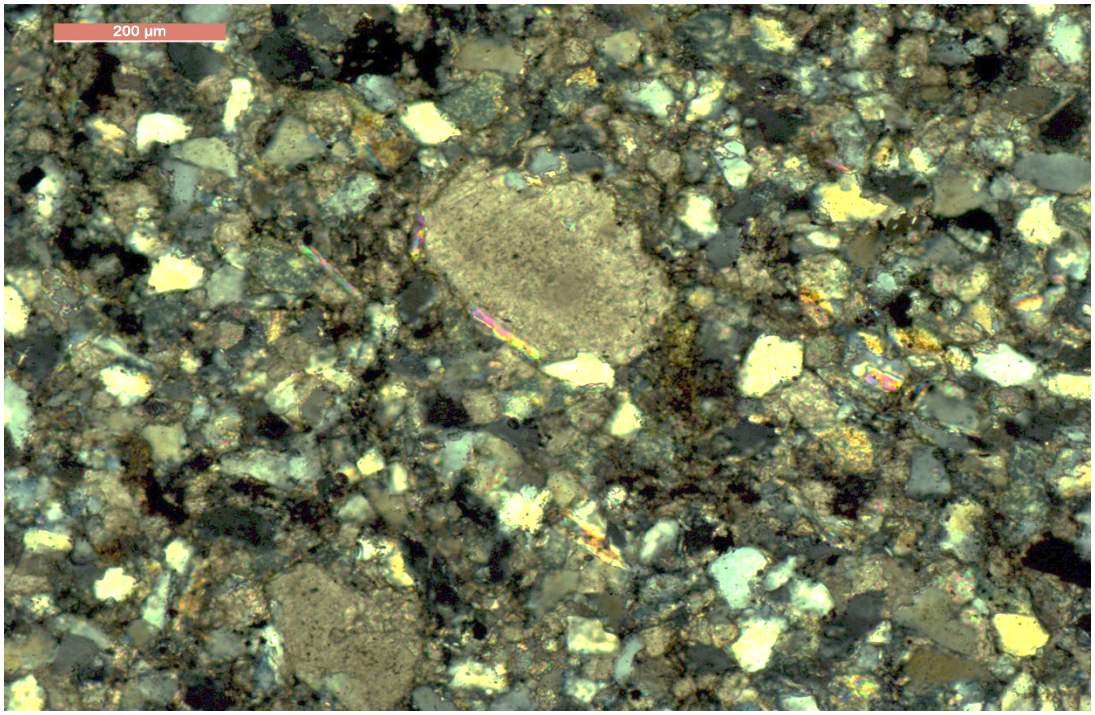

Figure 4. Sample G410181, showing a glauconitic, limey sandstone, similar to the above, but containing some coarser carbonate and platy muscovite grains. (XPTL).

XRD ANALYSES

The samples were prepared, examined, and analysed in the MRT laboratories, Rosny Park, Tasmania. They were run on a Rigaku Miniflex 600 X-Ray Diffractometer system: a 600W generator 150mm goniometer with a Cu tube; 40kV/15mA, sample spinner and a Scintillation counter (SC) with Be window, 3° to 63 ° 2Theta-2Theta scanning range, with a scanning speed of 0.5 °/min, a graphite counter monochromator and a Kß Ni- filter. The analysis software used is the PDXL2 using the ICCD database.

Quantification is largely manual, using a series of prepared standards of the more common minerals to enable some semi-quantitative analysis. Quartz, if present, is used as an internal standard; and if not present, it is often added to the sample for a supplementary scan. Our semi-quantitative results are calculated using single-peak calibration factors derived from scans of known mixtures of minerals.

The results are shown in Appendix 1 and indicate the sample is dominantly comprised of quartz, illitic mica (probably mostly glauconite), dolomite and trace feldspars.

DISCUSSION AND CONCLUSIONS

The sample G410181 from the Kimberley borehole contains angular rock fragments of a recrystallised, dark reddish grey hematitic, glauconitic, dolomitic sandstone. In terms most of its mineralogy, textures and degree of recrystallisation, it closely resembles some samples of Ordovician rocks from the transition beds between the Owen Group sandstones and the Gordon Group limestones. The dolomitic nature of these Ordovician sandstones seems uncommon, but is recorded elsewhere in Tasmania, mostly adjacent to carbonate horizons in massive quartzitic sandstones (Corbett, 1965).

REFERENCES

Corbett, K.D., 1965? Gordon Investigation. Addendum to geological investigation progress report 644-92-2 on the Lower Gordon Damsites. Unpub. Report for the HEC.

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Mineral Resources Tasmania

Appendix 1: MRT Laboratory Report

Lab Job No.: LJN2021-030
Submitted by: DPIPWE
Analysis type: XRD
Date completed: 25/03/2021
Analyst: L Unwin
MRT Laboratory Manager: Ralph Bottril

XRD Results-G410181-LJN2021-030-DPIPWE-QA1-25/3/21

General Information

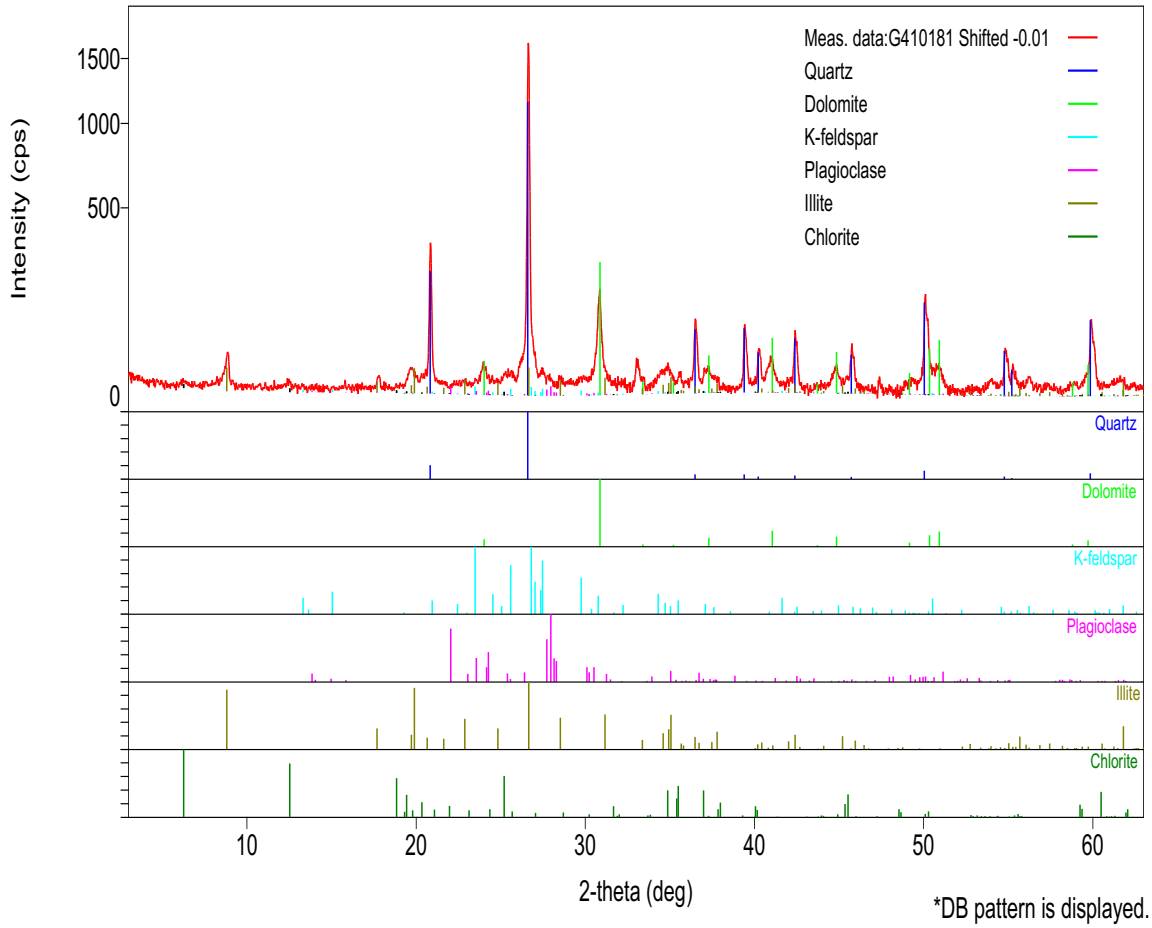
Measurement date:	25/03/2021	**Interpretative date:**	25/03/2021
Job Number/Client:	LJN2021-030-DPIPWE	**XRD**	Rigaku Miniflex 600
Registration Number:	G410181	**Analyst:**	LUnwin
Quantitative Method:	PDXL Relative Heights	**Process Medium:**	Wholerock
Sample Holder:	Standard	**Speed (deg/min):**	0.5
Comment:	Shifted -0.01		

Analysis Results

Phase name	Content wt% (± error)	Formula
Quartz	dominant	SiO_2
Plagioclase*	trace	$NaAlSi_3O_8$
Dolomite*	major	$CaMg(CO_3)_2$
K-Feldspar*	trace	$K(AlSi_3O_8)$
Illite*	accessory	$K_{0.7}Al_2[Al_{0.7}Si_{3.3}O_{10}](OH)_2$
Chlorite*	trace	$(Fe,Mg,Al)_6(Si,Al)_4O_{10}(OH)_8$

Notes
Peak overlap may interfere with identifications and quantitative calculations.
Amorphous minerals and minerals present in trace amounts may not be detected.
Plagioclase* probably Albite
K-Feldspar* probably Orthoclase
Dolomite* possibly Dolomite/Ankerite solid solution
Chlorite* possibly Corrensite
Illite* may include glauconite and some muscovite

Phase Data Pattern



*DB pattern is displayed.