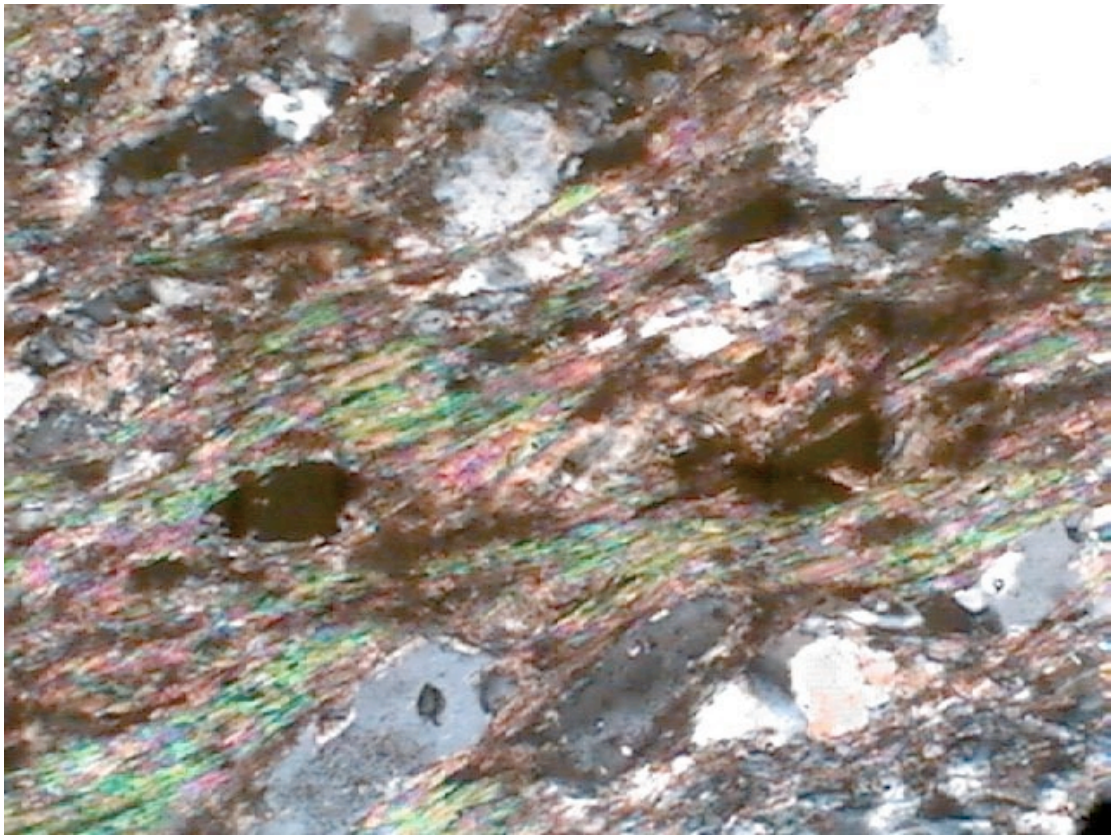
Petrographic descriptions and density measurements of two metasedimentary basement samples, Bunga Creek-2, Lakes Entrance area, Gippsland

GEOTRACK REPORT #870B



A report prepared for Lakes Oil, N.L., Melbourne

Report prepared by: I. R. Duddy

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EXECUTIVE SUMMARY

Introduction and Objectives

Two metasediment basement samples, a fine-grained "quartzite" and a "slate" supplied by Lakes Oil N.L from 351 m (RT) in the Bunga Creek-2 borehole, Lakes Entrance area, Gippsland, for density measurement and petrographic description.

Key Conclusions

1. Densities of 2.78 g/cc and 2.68 g/cc were determined for sample of slate (GC870-2A) and quartzite (GC870-2b), respectively, obtained from the basement core from the Bunga Creek-2 borehole.

3. On the basis of the optical petrography sample GC870-2A is classified as a SLATE and sample GC870-2B is regarded as a QUARTZITE, consistent with Palaeozoic metasedimentary basement.

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GEOTRACK REPORT #870B

1. Introduction

1.1 Sample details and methods

This report comprises density measurements and petrographic descriptions of two metasediment basement samples, a fine-grained "quartzite" and a "slate" supplied by Lakes Oil N.L from 351 m (RT) in the Bunga Creek-2 borehole, Lakes Entrance area, Gippsland.

The density of each sample, designated GC870-2A ("slate") and GC870-2B ("quartzite") was measured using heavy liquids progressively diluted with known volumes of ethanol calibrated with glass density standards that encompass the density of the unknown samples.

The petrography of each sample was described from polished thin sections using an optical petrographic microscope. The descriptions are illustrated with several digital images.

1.2 Report structure

The main conclusions of the report are presented in the Executive Summary. Section 1 of this report provides a brief summary of the samples analysed, the methods used and the report structure. Details of the density determinations are provided in Section 2. The petrographic description for each sample, including digital photomicrograph images, is presented in Section 3.

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Figure 1.1: Locations of Bunga Creek-2 (samples GC870-2A & -2B together with the Bunga Creek-1borehole and abandoned quarry (sample RD59-32) from which granite samples were analysed in Geotrack Report #870.

2. Density determinations for Bunga Creek-2 metasediments

The density of each sample was measured using heavy liquids progressively diluted with known volumes of ethanol until the sample sank. The liquid density was calibrated with glass density standards that encompassed the density of the unknown samples.

	cc	Comments
Volume of liquid of density 2.605 g/cc	300.00	2.605 g/cc standard just floats
Volume of TBE density 2.96 g/cc added	310.00	Sample GC 870-2A just floats
Total volume	610.00	
Calculated density of "SLATE" sample 870-2A	-	2.78 g/cc
Volume of ethanol of density 0.791 g/cc added	35.00	Sample 870-2B just floats
Total volume	645.00	
Calculated density of "QUARTZITE sample 870-2A	-	2.68 g/cc

Note:

Each sample weighed around 50 g.

3. Petrographic descriptions

Brief petrographic descriptions were requested for two metasediment core samples of presumed Paleozoic ages recovered from the Bunga Creek-2 borehole (Lakes Oil N.L. (AMG Ref. 591198 E 5810294 N), from the Lakes Entrance area, and these were carried out by Dr. Ian Duddy.

3.1 GC 870-2A: "Slate " Bunga Creek-2 Borehole, 351 metres (RT).

Texture: Fine-grained metasediment with well-developed slatey cleavage defined by metamorphic muscovite. Original siltstone or fine sandstone laminae now consist of amalgamated polycrystalline quartz layers. No visible porosity.

Mineralogy: Muscovite (major), polycrystalline quartz, plagioclase, minor pyrite.

Rock name: Slate

Images: Representative thin-section photomicrographs shown in Figures. 3.1 to 3.3.

3.3 GC 870-2B: "Quartzite" Bunga Creek-2 Borehole, 351 metres (RT).

Texture: Medium to coarse grained metasediment with sandy texture, some obvious slatey cleavage defined by metamorphic muscovite transitional to slate. Grains of what may be original detrital plagioclase typically 0.3 to 0.6 mm in diameter. Much of the quartz is polycrystalline with clear evidence of growth and amalgamation, so original grainsize is not obvious. No visible porosity.

Mineralogy: Polycrystalline quartz (major), muscovite, plagioclase, minor pyrite, zircon.

Rock name: Quartzite

Images: Representative thin-section photomicrographs shown in Figures 3.4 to 3.7.

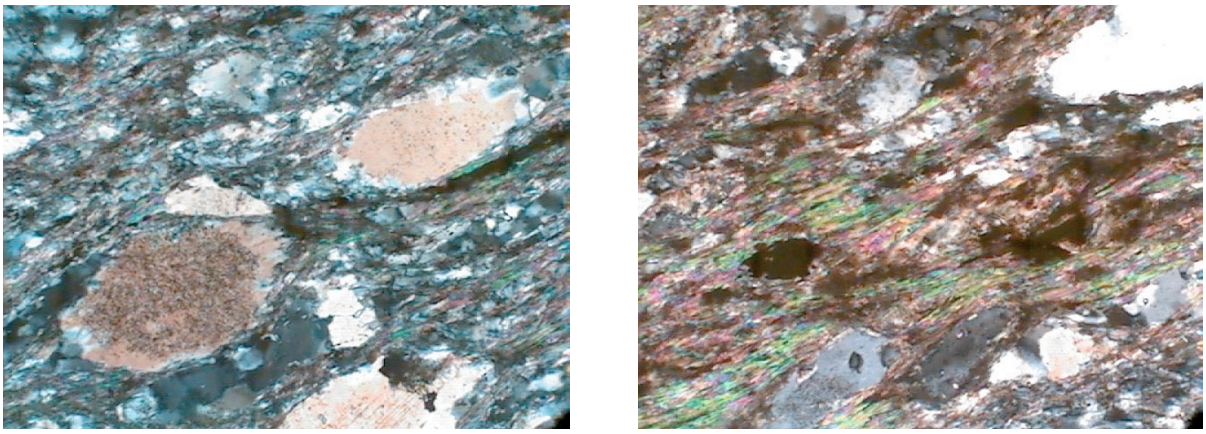

Figure 3.1: SLATE, Bunga Creek-2. Both images crossed polars. Width of EACH field of view = 0.76 mm
LEFT: Polycrystalline metamorphic quartz and altered ?feldspar grains in finer grained quartz and muscovite matrix.
RIGHT: Slatey cleavage with well-developed muscovite and polycrystalline metamorphic quartz.

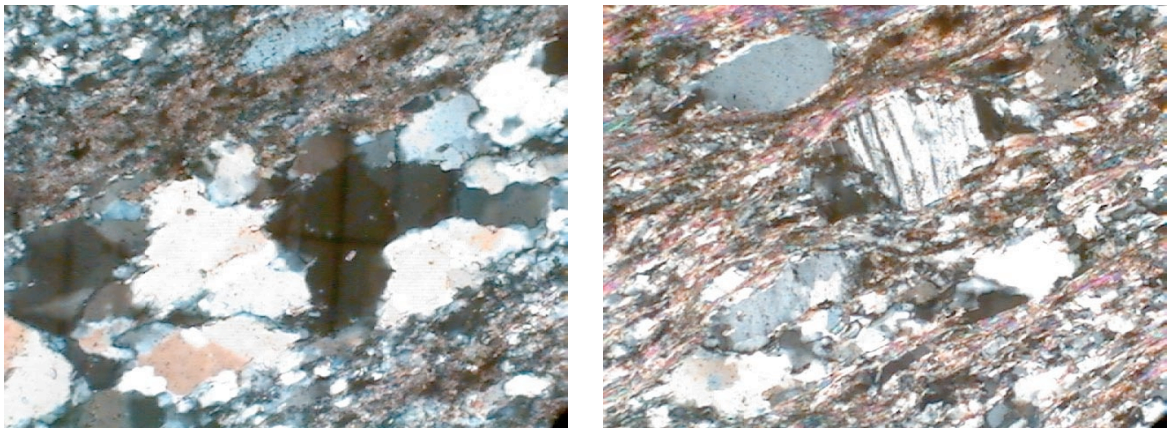

Figure 3.2: SLATE, Bunga Creek-2. Both images crossed polars. Width of EACH field of view = 0.76 mm
LEFT: Polycrystalline metamorphic quartz layer presumably developed from an original quartz sand or silt laminae.
RIGHT: Plagioclase grain, Polycrystalline metamorphic quartz with slatey cleavage defined by muscovite.

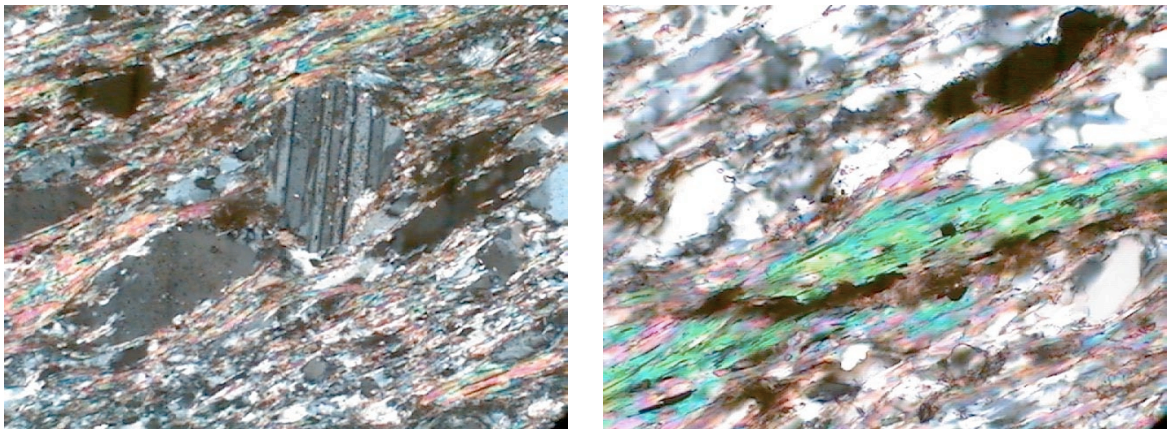

Figure 3.3: SLATE, Bunga Creek-2. Both images crossed polars. Left width of field of view = 0.76 mm; Right width of field of view = 0.38 mm.
LEFT: Polycrystalline metamorphic quartz layer presumably developed from an original quartz sand or silt laminae.
RIGHT: Well-developed muscovite in slatey cleavage.

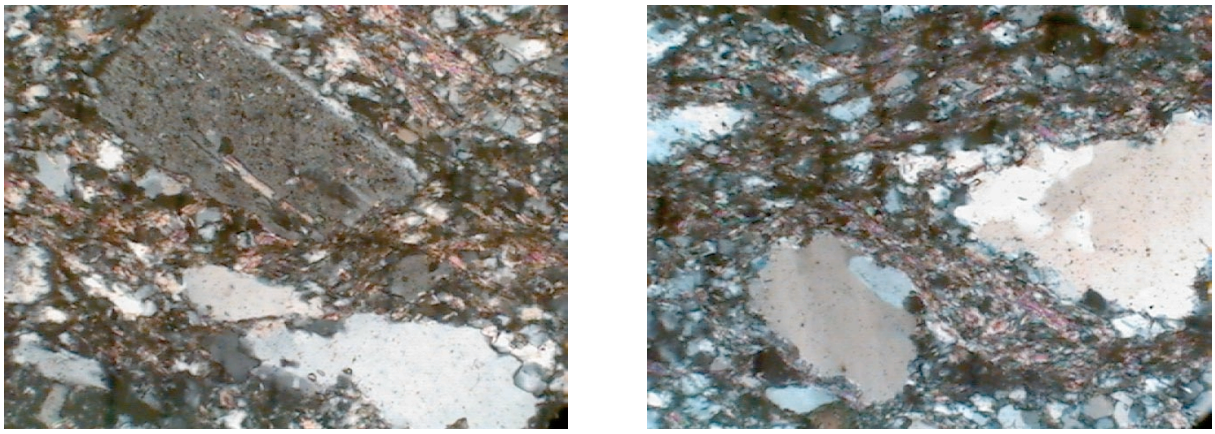

Figure 3.4: QUARTZITE, Bunga Creek-2. Both images crossed polars. Width of EACH field of view = 0.76 mm
LEFT: Large feldspar (~0.5 mm long) and polycrystalline metamorphic quartz. Note alignment of muscovite in feldspar with that in matrix.
RIGHT: Well-developed polycrystalline metamorphic quartz.

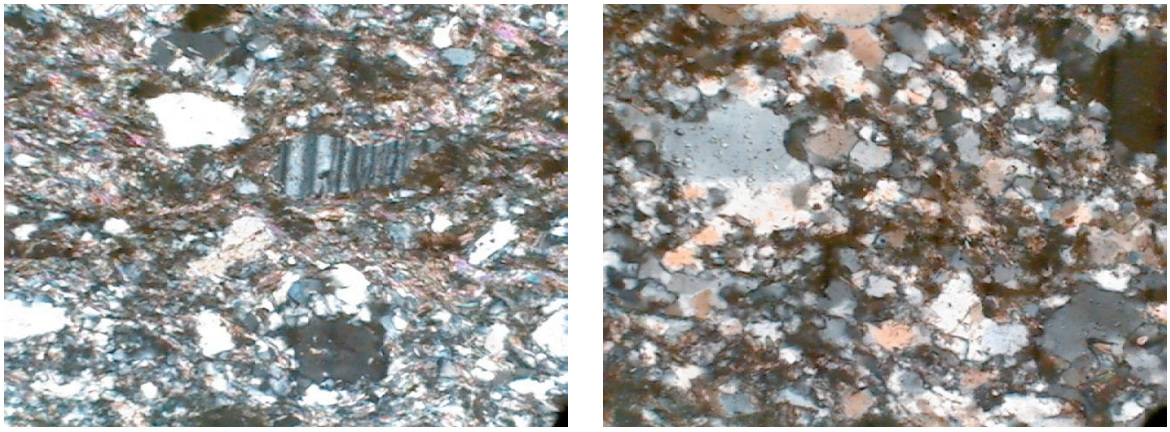

Figure 3.5: QUARTZITE, Bunga Creek-2. Both images crossed polars. Width of EACH field of view = 0.76 mm
LEFT: Plagioclase grain, fine grained metamorphic quartz and muscovite within slatey cleavage cutting quartzite.
RIGHT: Quartz-rich field showing range in grainsize of polycrystalline quartz.

Figure 3.6: QUARTZITE, Bunga Creek-2. Both images crossed polars. Width of EACH field of view = 0.76 mm
LEFT: Slatey cleavage layer defined by muscovite with polycrystalline quartz
RIGHT: Large plagioclase grain with minor muscovite alteration.

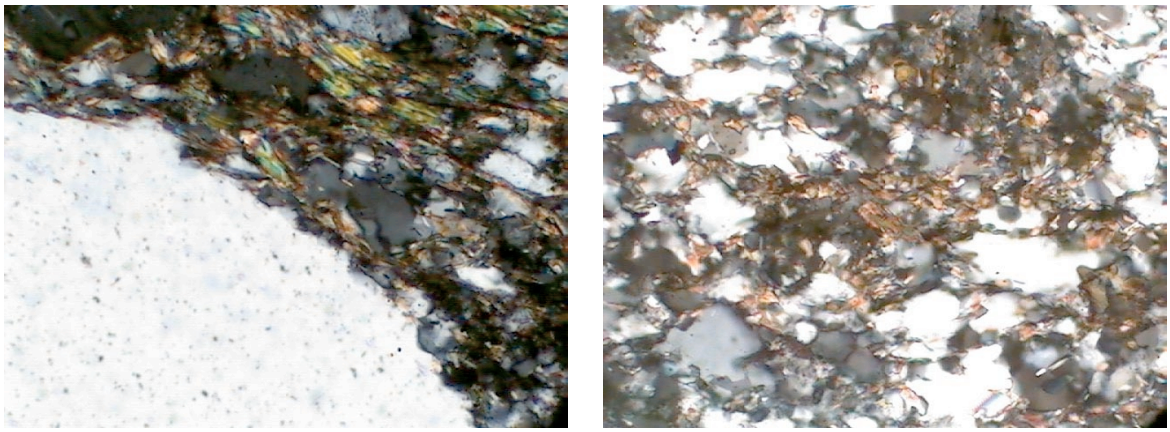

Figure 3.7: QUARTZITE, Bunga Creek-2. Both images crossed polars. Width of EACH field of view = 0.38 mm
LEFT: Detail of boundary between large quartz and matrix of muscovite and fine-grained quartz.
RIGHT: Detail of matrix consisting of muscovite and fine-grained quartz.