

GEOCHEMPET SERVICES, BRISBANE

# Geochempet Services

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## PETROGRAPHIC REPORT ON A HAND SPECIMEN (3) FROM GLENDON QUARRY

prepared for

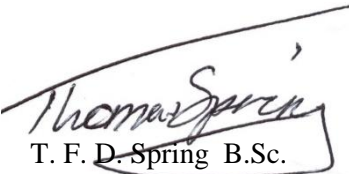
### GLENDON QUARRY EMERALD

Purchase Order:

Invoice Number: 00007077

Client Ref: John Osborne

Issued by

  
T. F. D. Spring B.Sc.  
20 April 2016

April, 2016

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**Sample Label:** 3 **Date Sampled:** 29/03/2016

**Sample Type:** Hand Specimen **Date Supplied:** 30/03/2016

**Sample Source:** Glendon Quarry **Date Recieved:** 01/04/2016

**Work Requested** Petrographic analysis in relation to suitability for use as a source for road base, concrete aggregate, asphaltic/sealing aggregate, rip-rap, marine armour rock, dimension stone and rail ballast; petrographic assessment of potential for alkali-silica reactivity

**Methods** Account taken of ASTM C 295 Standard Guide for *Petrographic Assessment of Aggregates for Concrete*, the AS2758.1 – 1998 *Aggregates and rock for engineering purposes part 1; Concrete aggregates (Appendix B)*, the AS1141 Standard Guide for the *Method for sampling and testing aggregates*, of the content of the 1996 joint publication of the Cement and Concrete Association of Australia and Standards Australia, (HB 79-1996) entitled *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia*, and in accordance with ASTM C 294 Standard Guide for *Petrographic Assessment of Railway Ballast* and to the content of the 1996 publication of Standards Australia (AS 2758.7 – Appendix B), entitled *Aggregates and Rock for Engineering Purposes- Part 7: Railway Ballast*, and in accordance with ASTM C1721-09 *Standard Guide for Petrographic Assessment of Dimension Stone*, and in accordance with ASTM D4992-07 *Standard Guide for Evaluation of Rock to be used for Erosion Control*.

**Identification** Olivine basalt

## **Description**

The sample consisted of a single large block-shaped hand specimen of essentially unweathered, hard, robust, dark grey basalt. Joint surfaces are partly coated by a dark greenish clay but are otherwise fresh surfaces. The rock can only be lightly scratched by a steel tool.



**Figure 1:** Digital image of supplied hand specimen.

A thin section was prepared to permit microscopic examination of the specimen. An average composition of the rock, expressed in volume percent and based on a brief count of 100 widely spaced observation points falling within the thin section, is:

### **Primary Components**

- 63% plagioclase feldspar
- 10% clinopyroxene
- 9% opaque oxide (magnetite and/or ilmenite)
- 5% remnant olivine
- <1% mesostasis of blackish-brown glass darkened by microlites of pyroxene and opaque oxide
- <1% apatite
- 1% late yellow glass

### **Secondary Minerals**

- 12% brownish-green clay of smectite style (nontronite)

Microscopically, the rock is seen to consist of porphyritic, mildly to moderately flow-aligned, sub-ophitic to ophitic, finely crystalline textures of basaltic style. The phenocrysts are about 0.4 to 1.5 mm in size. The groundmass is dominated by mildly flow aligned feldspar laths in a cellular pattern (about 0.1 to 0.3 mm long), along with other smaller mineral grains.

Plagioclase phenocrysts and large pyroxene xenocrysts (with reaction coronas) are fresh. Olivine occurs as phenocrysts: the largest of which most commonly show slight alteration to

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greenish-brown clay of smectite style. Minor additional clay occurs filling irregular groundmass interstices, some of which have replaced late, green to yellow glass. Plagioclase occurs as multiply twinned, fresh groundmass laths. Other fresh groundmass minerals are complexly-shaped aggregates of pyroxene, equant to minor platy opaque oxides (magnetite and/or ilmenite) and acicular, fine apatite. A sparse mesostasis consisting of opaque oxide and pyroxene microlites in blackish-brown glass is present interstitially in the rock.

## Comments and Interpretations

This supplied hand specimens (labelled 3) from the Glendon Quarry, Emerald is considered to consist of olivine basalt, a basic volcanic rock which crystallized probably along the periphery of a lava flow.

For engineering purposes, the supplied rock sample may be summarised as:

- **olivine basalt**, a basic volcanic rock
- finely crystalline
- essentially unweathered
- lightly altered
- having an average secondary mineral content of about 12% (comprising brownish-green smectite clay)
- **hard**
- **strong**

The rock is predicted to be **durable**.

The basalt is essentially devoid of free silica: consequently, it is predicted to be **innocuous in relation to alkali-silica reactivity**. There is about 1% of a late, fractionated glass which may be mildly enriched in silica, but the amount is interpreted to be insufficient to have a deleterious impact but the late glass component should be monitored if the product contains an abundance of glassy variants (accelerated mortar bar test applied).

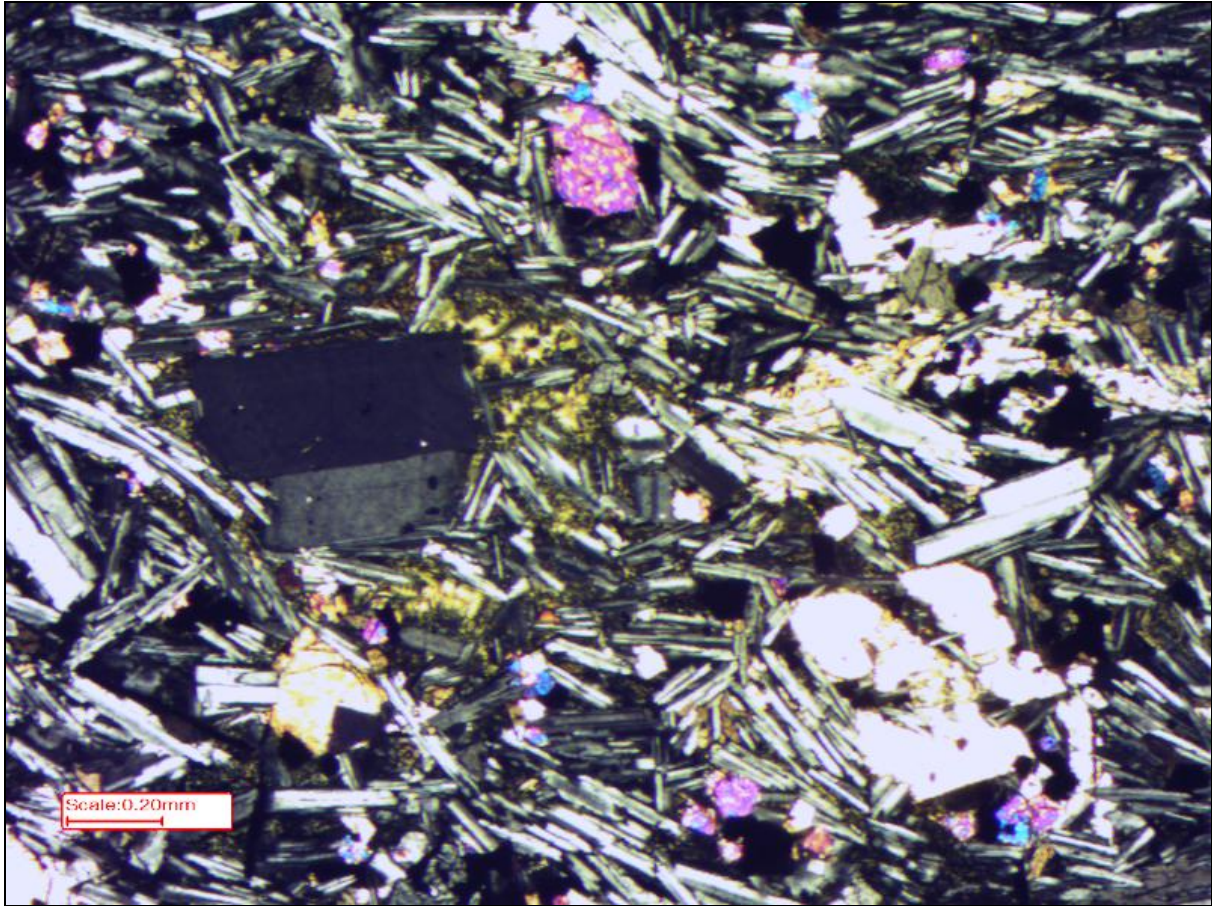
Basalt essentially equivalent to that represented in the supplied sample is predicted to be **suitable for use as a source rock for road base, concrete aggregate, asphaltic/sealing aggregate and rail ballast**.

Rock represented by the supplied hand specimen is considered to be **suitable as a source for rip rap and marine armour rock**. This assessment is conditional, provided that large enough blocks can be exhumed from the quarry, that are free of jointing or fractures.

Rock similar to the supplied sample is possibly **suitable as a source for dimension stone**. This assessment is conditional, provided that large enough blocks can be extracted from the quarry, that are free of jointing or fractures. The 12% smectite clay is enclosed in robust minerals but may prove difficult to polish.

## Free Silica Content

Apparently nil but a trace of cryptocrystalline quartz may be concealed in late glass; a XRF/XRD analysis may clarify silica content.



**Figure 2:** Micrograph taken at low magnification with transmitted cross polarised light. Image shows the typical mineral assemblage observed with a matrix of flow aligned plagioclase and clinopyroxene crystals surrounding larger phenocryst of plagioclase, olivine and minor clinopyroxene.