Geochempet Services

ABN 980 6945 3445
PETROLOGICAL and GEOCHEMICAL CONSULTANTS
Principals: K.E. Spring B.Sc. (Hons), MAppSc and H.M. Spring B.Sc.

5/14 Redcliffe Gardens Drive
Clontarf, QLD 4019

Telephone: (07) 3284 0020

Email: info@geochempet.com
www.geochempet.com

PETROGRAPHIC REPORT
ON A 20 mm AGGREGATE SAMPLE (W61685 (#16)
EX OBERON QUARRIES

prepared for

NETWORK GEOTECHNICS PTY LTD
NSW

Purchase Order: TM8917
Invoice Number: 00007851
Client Ref: Tim Mathie

Issued by

T. F. D. Spring BAppSc. MAppSc
9 October 2017

GEOCHEMPET SERVICES, BRISBANE

Sample Number:	W61685 (#16)	**Date Sampled**:	08/09/2017
Product Type:	20 mm Aggregate	**Date Received**:	13/09/2017
Job Number:	W07/4198	**Source**:	Oberon Quarries

Work Requested Petrographic analysis in relation to suitability for use concrete aggregate: petrographic assessment of potential for alkali-silica reactivity

Methods Account taken of ASTM C295 Standard Guide for *Petrographic Assessment of Aggregates for Concrete,* the AS2758.1 – 2014 *Aggregates and rock for engineering purposes part 1; Concrete aggregates (Appendix B),* the AS1141 Standard Guide for the *Method for sampling and testing aggregates* and of the content of the 2015 joint publication of the Cement and Concrete Association of Australia and Standards Australia, (HB 79-2015) entitled *Alkali Aggregate Reaction - Guidelines on Minimising the Risk of Damage to Concrete Structures in Australia*

Identification: Partly glassy olivine basalt

Description:

The sample consisted of 2 kg of robust, hard angular fragments of essentially unweathered, dark grey, fine-grained basic igneous rock. The rock is lightly coated by an easily removed fine dust.

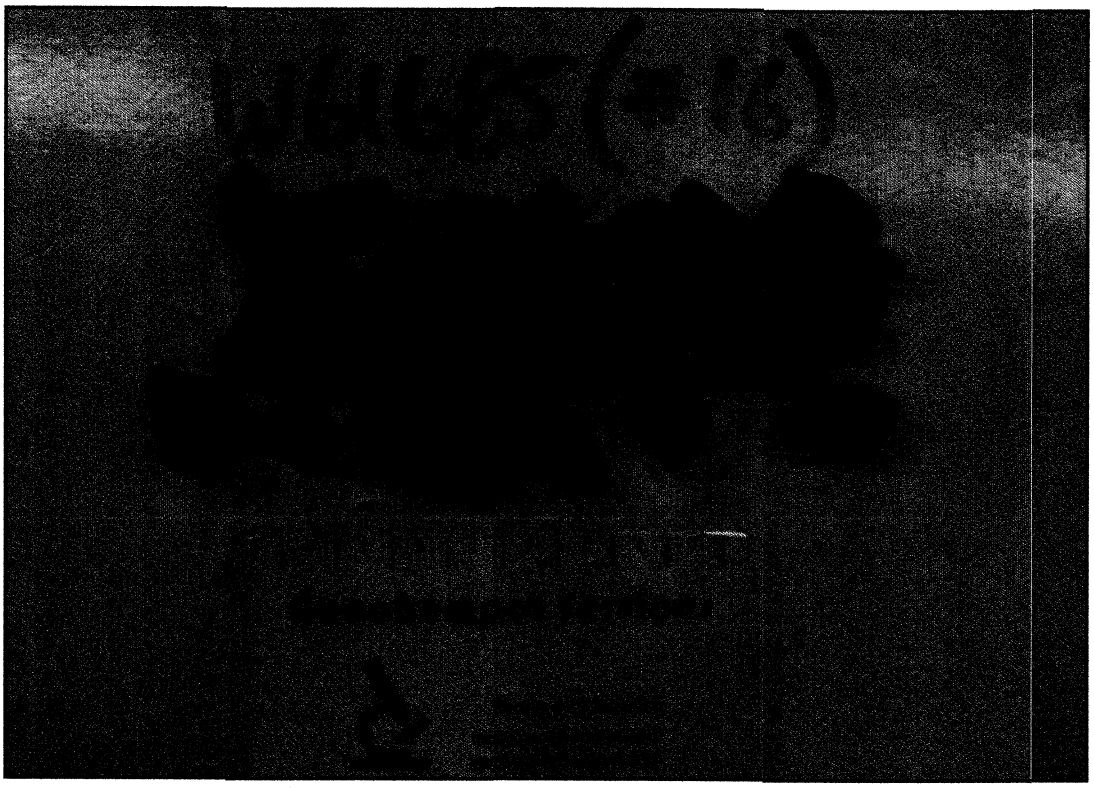

Figure 1: Image of washed sub sample form supplied aggregate

A thin section was prepared from 5 randomly selected fragments to allow detailed microscopic examination in transmitted, polarized light. An approximate composition of the rock, expressed in volume percent and based on a brief count of 100 widely spaced observation points in sectioned fragments, is:

Primary components

26%	plagioclase feldspar
38%	clinopyroxene
10%	brown glass
9%	olivine
7%	opaque oxide

Secondary minerals

9%	green clay of smectite style (nontronite)
1%	iddingsite

In thin section the rock displays typical textures ranging from porphyritic, hypidiomorphic, finely crystalline and intersertal, partly glassy, volcanic textures of basaltic style. The phenocrysts are about 0.5 to 2.5 mm in size. The framework of the rock is formed by randomly orientated to faintly flow-aligned feldspar laths about 0.05 to 0.2 mm long and smaller pyroxene grains. Interstitial brown glass is common, but does not appear to form a well-connected network.

The sparse phenocrysts and many disseminated groundmass grains are mainly fresh euhedral and subhedral olivine, but some are partly or completely altered to green clay of smectite style (nontronite). Other irregular and interstitial green smectite clay appears to be replacing late glass. All other primary components remain quite fresh. They comprise twinned laths of plagioclase feldspar, small grains and prisms of faintly brown clinopyroxene, equant grains of opaque oxide (magnetite and/or ilmenite) and interstitial pale brown glass (dusted with tiny microlites of opaque oxide).

Comments and Interpretations:

This supplied 20 mm aggregate sample (W61685 (#16)) is identified as partly glassy olivine basalt. Its textures are consistent with a basic volcanic rock probably from a lava flow. The basalt has experienced light to moderate alteration of deuteric style (i.e alteration during initial cooling), resulting in selective, but variable alteration of its disseminated olivine grains and interstitial late glass to nontronitic, green smectite clay (a water-sensitive, swelling type of clay).

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

- **olivine basalt** (a basic igneous volcanic rock)
- finely crystalline and
- partly glassy
- non-porous
- essentially unweathered
- lightly altered

- secondary minerals amount of 10% (specifically carrying 9% of secondary green smectite clay and 1% iddingsite)
- **hard**
- **strong**

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

The basalt lacks free silica: consequently, it is predicted to be innocuous in relation to alkali-silica reactivity in concrete. The observed brown glass is a common basaltic type which is considered to be undersaturated in silica and consequently innocuous. The rock is predicted to be **innocuous in relation to alkali-silica reactivity in concrete.**

In short, aggregate of the type represented by the supplied sample is predicted to be **suitable for use as concrete aggregate.**

Free Silica Content

Apparently Nil

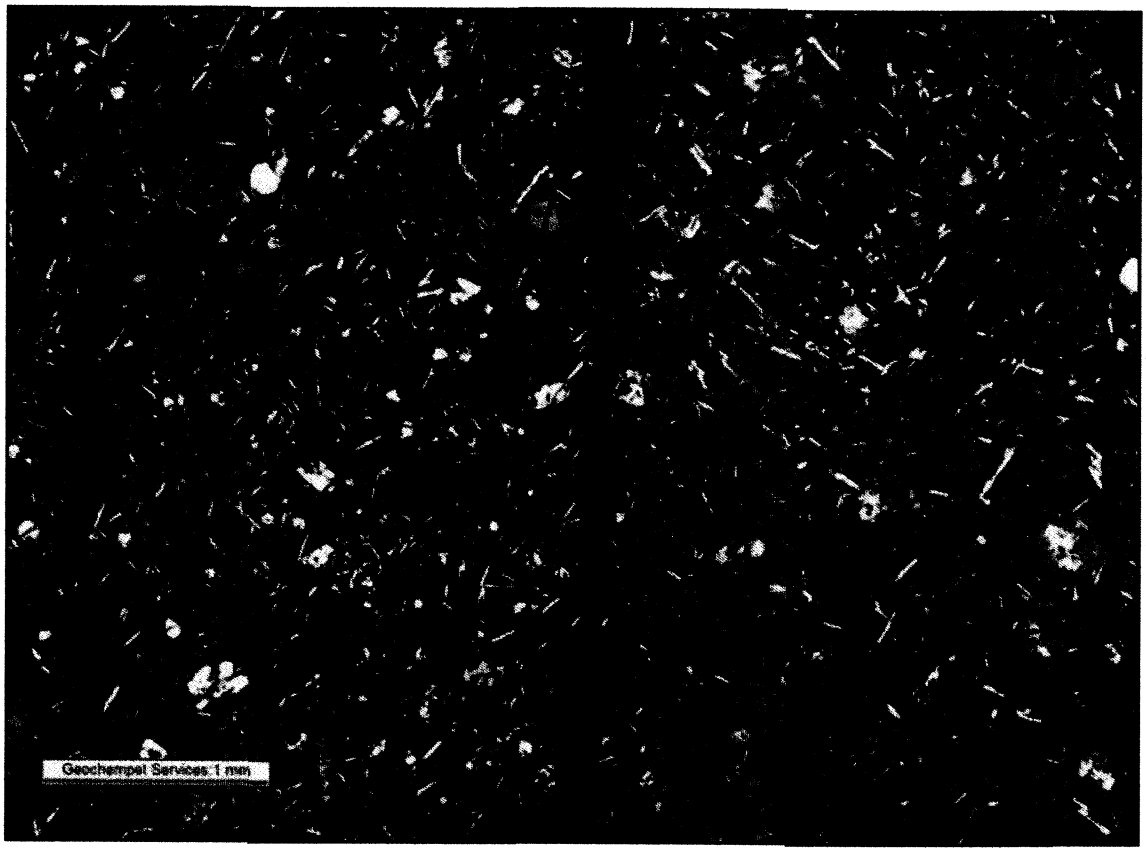

Figure 2: Micrograph of two fragments selected for petrographic analysis, taken at low magnification in transmitted cross polarised light. The fragment on the left is less altered and therefore glassier then the fragment on the right that is more altered, however they are both containing the same basic mineral assemblage dominated by clinopyroxene, plagioclase and olivine.